

1ST ANNIVERSARY SPECIAL

FEBRUARY 2015 | ₹150

# Discovery

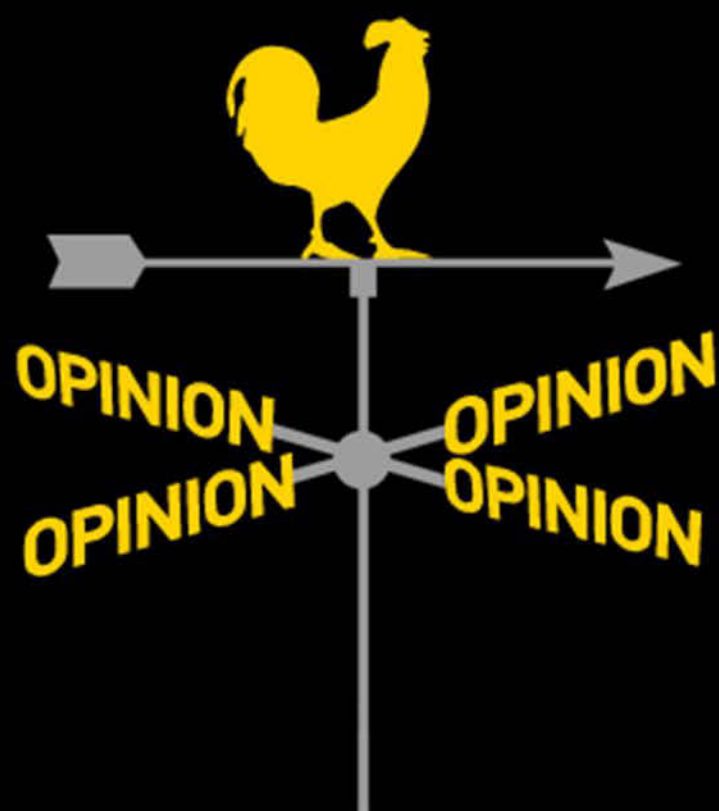
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# A FEAST FOR CURIOUS MINDS

## Welcome to the 1st Anniversary issue of *Discovery Channel Magazine India*.

When we launched this title a year ago, we thought of it as a "knowledge magazine". Aligned with one of the best known science and information TV channels in the world, *Discovery Channel Magazine India* was to be a feast for curious minds. It would cover science and technology, breakthroughs and innovations and spark ideas and new thinking. As it turns out, it did all of that and more.

*DCM India*, over the last 12 months, has encouraged imagination. It has asked questions that may not have immediate clear answers. But it has successfully brought out the scientific and factual viewpoints that could eventually inspire a conclusion. It has put into print the eternal quest for information that can then spur growth and change.

Regular readers will remember some iconic features *DCM India* has put out. This is the magazine that did an 8-page photo feature profiling rush hour crowds from major cities across five continents, then followed it up with a piece on crowd psychology and how to keep your vision above the herd. This magazine sent reporters to camp with the most elite armed forces in the world to come back with stories that showed how aggression can be an extremely brittle emotion. And in travel, *DCM India* charted out a 2,000 km-long trail to follow in North Tanzania that's guided not by tour operators, but



by movements of wild animals. All these features were accompanied by spectacular pictures by award-winning photographers that created a cerebral and visual treat.

In this special issue, you will find a special photo feature chronicling landmark events over the last 12 months called 'One Year Of Discovery.' In keeping with the season of love, there's a story on foods that are said to be aphrodisiacs, and the scientific reasoning behind the belief. A brilliant feature on urban planning talks about how our cities need to change for the future; and another story on animal architecture tells you how burrows and nests can impress human living.

Reading, dear friends, is an exercise that fuels imagination by encouraging you to create scenarios of your own, unlike television which serves up visuals for you to consume. Each person's takeaway from an article is different and unique. *Discovery Channel Magazine India* will continue to encourage individual ideas and bring to you information that intrigues, excites and inspires. Keep reading, and keep discovering...

**Aroon Purie**  
**Editor-in-Chief**





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If exploring the world of wines gives you the same high as a couple of glasses of it, you know what your true calling is



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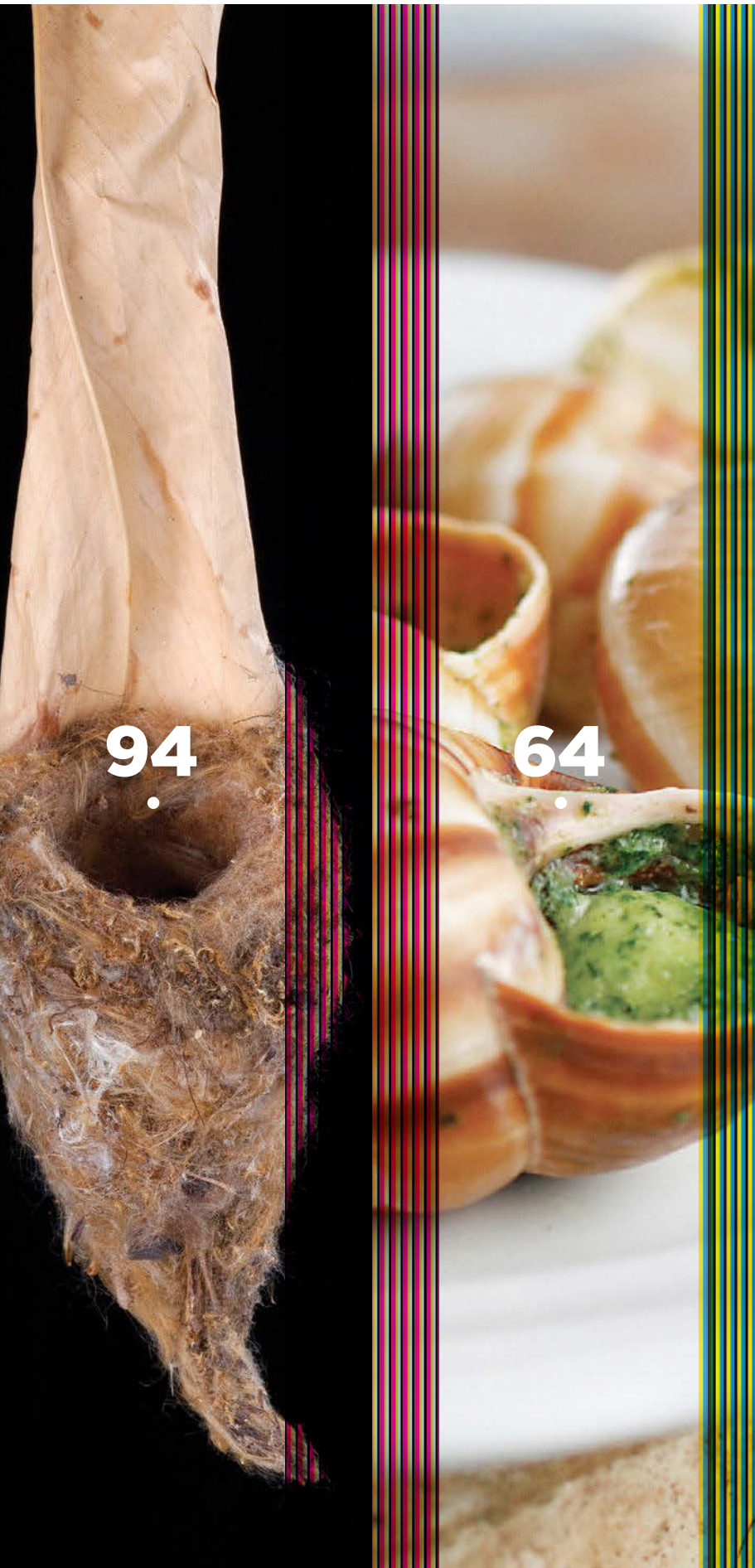


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# FEATURES

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The world's best architects exist in the wild. Marvel at the gorgeous intricacy of bird nests, ant mounds and bee hives

## FROZEN

Kasia Biernacka's photograph "Under the Glacier" was the winning image of the photo competition in the Kendal Mountain Festival, an annual event covering all aspects of mountain and adventure sports culture and one of the main social events for outdoor enthusiasts in the UK. Judges found it to be the standout shot in a group of outstanding images from the world of adventure. In the shot, Biernacka captures Spanish caver Ester Molina in an ice cave under a glacier on the slope of Peña Castil mountain, Picos de Europa (Europe's Peaks) in Northern Spain. That year the snow cap was very thin so the sunlight was able to penetrate through it.

PHOTO: KASIA BIERNACKA/KENDAL MOUNTAIN FESTIVAL







# FRONTIERS

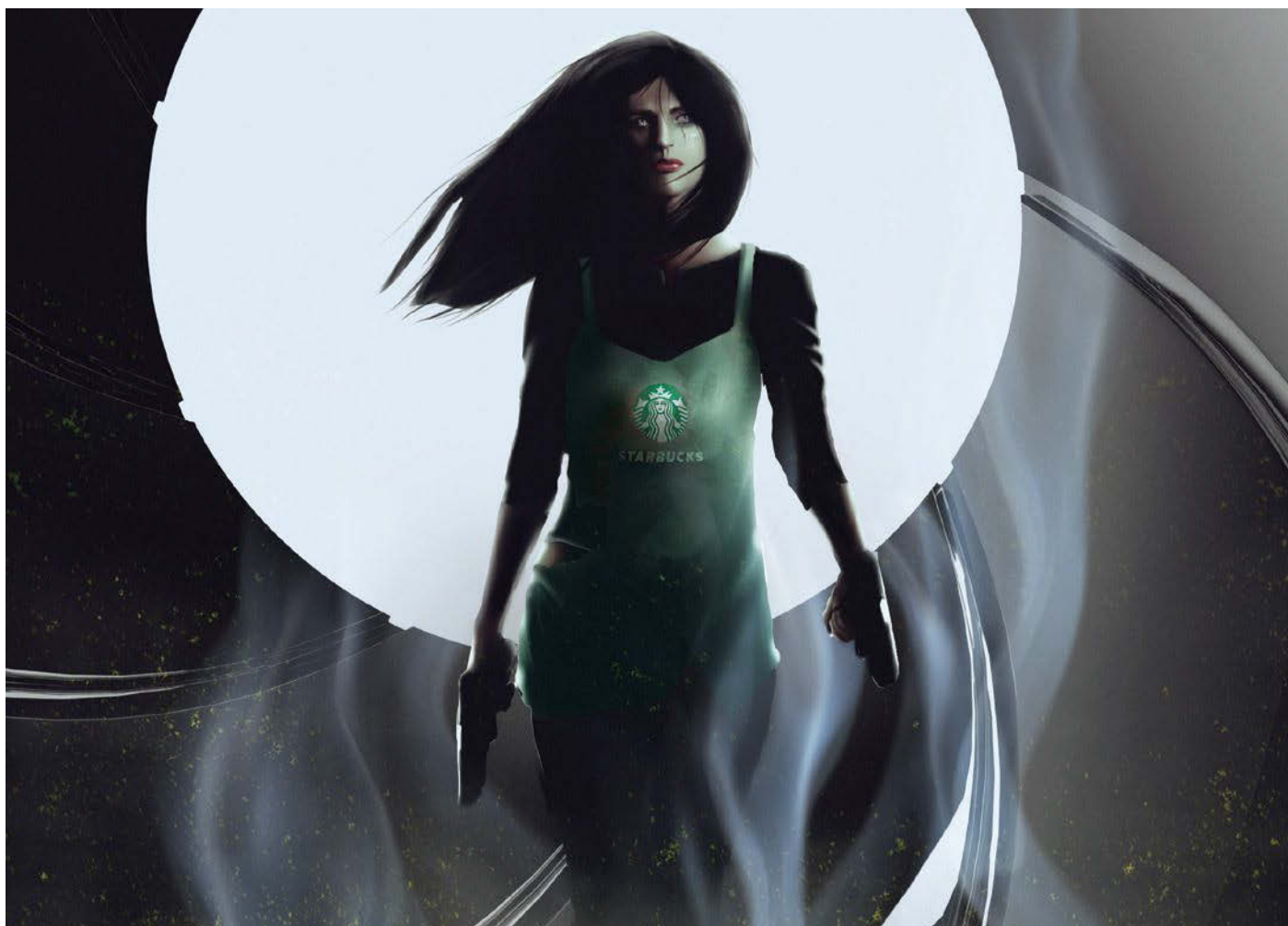


ILLUSTRATION QUENTIN GABRIEL

## COVERT COFFEE: OF SPYING GAMES, CIA AGENTS AND UNDERCOVER CUPPAS!

Starbucks and the CIA (Central Intelligence Agency) may seem like odd bedfellows. And indeed they are. **Every Starbucks in the world writes the name of the customer on the cup — except the franchise located within the CIA compound in Langley, Virginia.** As an unnamed food security supervisor at the CIA told the Washington Post, “Giving any name at all was making people — you know, the undercover agents — feel very uncomfortable. It just didn’t work for this location.” A few spymasters at the labyrinth-like facility even call it ‘stealthy

Starbucks’. Not surprising, considering its receipts just read ‘Store Number 1’. Baristas undergo stringent background checks and are escorted by minders if they want to leave their work area. As smartphones are not allowed on-site (too much of a security risk), customers can be heard passing time by practicing foreign phrases in German or Arabic. On the upside, history has been made in this spot — the leader of the team that helped find Osama Bin Laden recruited his key deputy at this very Starbucks. Let’s hope nobody was eavesdropping!



# THE GRID

STRANGE AND SERIOUS EVENTS FROM ACROSS THE WORLD

## ASIA-PACIFIC

## AMERICAS

## EUROPE

## MIDDLE EAST/AFRICA

### TOYS

#### TRUNK TRAMPLERS:

Indian farmers in the state of Tamil Nadu have taken to laying out stuffed toy tigers in their fields to scare away elephants from marauding their crops. Only problem — it's not working. "It has not really made an impact yet," admitted one farmer to the BBC. "Some elephants have trampled over the toy tigers." Perhaps the animals find the toys ir-elephant. Yes, that is a pun on the word irrelevant.

#### A METHY SITUATION:

DCM can only guess how many Breaking Bad action figures were sold over Christmas. They certainly caused controversy, featuring Bryan Cranston and Aaron Paul's likenesses complete with bags of "meth". Only problem? They were sold in kids' toy aisles, leading one Florida mom to call for their removal from Toys R' Us. In response, Cranston dryly tweeted, "I'm so mad, I'm burning my Florida Mom action figure in protest."

**GO LEGO:** Netizens have lit up with praise for Lego since it was revealed that in 1974, the company slipped a special note into its dollhouse sets, reading "The urge to create is equally strong in all children. Boys and girls. A lot of boys like doll houses. They're more human than spaceships. A lot of girls prefer spaceships. They're more exciting than doll houses. The most important thing is to put the right material in their hands and let them create whatever appeals to them."



### FISH

**FUGU BOOHOO:** You wouldn't think the puffer fish, which produces enough toxin in its body to kill 30 people, would have many enemies. But this infamous Japanese dish, known as fugu, is so popular that poor Puffy is being eaten to death. The species in question, Takifugu chinensis, is being overfished and now on the brink of extinction. Let's not forget that this is an animal that, if improperly prepared, will deliver numb lips and death within seconds.

#### JUNKIE SWIMMERS:

Canadians always seem so normal, don't they? Maybe not Leonard Grey. He has garnered attention for his unusual fishing bait: crack cocaine. Asked why it works so well, he snorted, "I have no flippin' idea. But I can tell you the fish can't get enough of this junk." Grey seems proud of his venture: "I'm kinda doing the community a service because I am taking drugs off the streets and putting 'em in the ocean," he said to the press.

#### LUNCH BELLS RINGING:

Seals may be sneaky when it comes to snagging lunch, say Scottish scientists. Working with 10 captive seals, they found that seals located fish more easily when acoustically tagged with a pinging attachment, similar to that used when tagging wildlife. That's bad news for researchers trying to get accurate numbers of fish stocks by tagging them in the wild — those fish might be getting eaten, skewing the numbers.

#### PARTY POOPING SHARKS:

A fish farm off the coast of the South African city of Port Elizabeth should be a good thing, right? Despite it bringing potential jobs to the area, not all are happy. Ironman South Africa director Paul Woolfe says that should the farm go ahead, he will have to move this year's Ironman triathlon. "One of many risks is that our athletes might be eaten by sharks, because the fish farm will lure bigger sharks to the bay that are not normally there."

### RUNNING

#### OUT OF BREATH:

Large-scale marathons are catching on in Asia, which is a problem for some cities. Last year, 26,000 runners in Beijing went ahead with their marathon despite describing the conditions as "like running on Mars", with many donning elaborate face masks. Only 15,000 completed the course. A month later thousands ran the New Delhi half-marathon in even worse pollution. Maybe it's time to start planning for indoor marathons.

**BIONIC BUY:** It's too late to buy one as a Christmas present, but that shouldn't stop you from picking up a pair of bionic boots. Created by the San Francisco-based inventor Keahi Seymour, these devices are attached to a spring-like sole that gives you a few extra inches in height. They also imitate the Achilles tendon of an ostrich, and allow you to attain its speed. Clad in these babies, you can sprint at 40 kilometres per hour. Sadly they're just prototypes for now.

**DARE TO BE BARE!** How do you make parkour, aka free running, even more gutsy? Answer: photograph a male free runner naked, on the streets of London (right). Shot in tasteful black and white, free running world champ Tim Shieff sprinted nude in the underground (and posed on the seats, urk!), jumped balconies and ran over roofs. He and the photographer claim they were barely noticed cavorting around the streets of London. Really?



## Toy Story

TOP SELLING TOYS FOR AMERICAN KIDS DURING THE 2014 HOLIDAY SEASON

**TOP TOYS FOR BOYS** 1 LEGO 2 Cars & Trucks 3 Teenage Mutant Ninja Turtles 4 Video Games 5 Hot Wheels 6 Xbox One 7 PlayStation 4 8 Transformers 9 Remote Controlled Vehicles 10 Marvel Action Figures (T)/Tablet/Apple iPad(T)

**TOP TOYS FOR GIRLS** 1 Disney Frozen Doll 2 Barbie 3 Dolls (generic) 4 Monster High Dolls 5 American Girl 6 Lego 7 Tablet/Apple Ipad 8 My Little Pony 9 Disney Doc Mcstuffins 10 Apparel

## DUTCH DOCS, FRENCH KISSING

DUTCH SCIENTISTS RECENTLY MONITORED 21 COUPLES WHILE THEY KISSED TO MONITOR HOW SMOOCHING TRANSFERS GERMS



80 MILLION

BACTERIA ARE TRANSMITTED WITH A SINGLE 10 SECOND KISS

## 1 GREAT QUOTE

"FRENCH KISSING IS A GREAT EXAMPLE OF EXPOSURE TO A GIGANTIC NUMBER OF BACTERIA IN A SHORT TIME," SAID THE HUGELY ROMANTIC LEAD RESEARCHER

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COST OF ADMISSION TO MICROPIA, A DUTCH MICROBE MUSEUM. COUPLES CAN NOW KISS AND EXAMINE AN INSTANT ANALYSIS OF WHAT BUGS THEY HAVE EXCHANGED. SEXY!

## PLANE FACTS

Flights of fantasy may just get worse, thanks to rare rainfalls and wind



the view projected everywhere, might turn even the hardest traveller into a Class A vomiter.

"Hell is other people," moaned the ever-gloomy Jean-Paul Sartre. He probably coined that from an economy class seat. Strap in and find out that it's getting worse.

For a start, there's the recent proposal from the Centre for Process Innovation (CPI) that planes in the future should be windowless. Interior screens of the plane cabin will project a real-time projection of the sky outside, thanks to exterior cameras. Not surprisingly, many netizens are cautiously asking, "Er, and what happens if you fly into a storm?"

Judging by mockup photos, this technology manages to make you feel both claustrophobic and agoraphobic, reminding you that you're in a tin can hurtling through the air at 150 metres per second. **Windowless cabins would save weight, argues CPI, forgetting that having**

On the plus side, though, CPI says by shedding pounds, their proposal could lead to wider seats. As anyone who's tried to squeeze their rear into a seat can tell you, that's a good thing.

Planes are getting fuller, too. In 1995, US planes operated on an average passenger load of 67 percent. Last year the average was 84 percent.

**Even the weather is conspiring to make air travel more hellish.**

In 2013, scientists analysed computer simulations of the jet stream over the North Atlantic. Their finding? Buckle up on the London to New York run. Thanks to climatic changes, the chance of hitting significant turbulence will jump by anywhere between 40 to 170 percent. And that turbulence will rock you like a hurricane, increasing by strength by up to 40 percent. Maybe cancel those holiday plans and curl up on the couch? Perhaps read a chapter from that cheery existentialist Sartre?



## Top of the Glass

London's Tower Bridge now has a sky walkway, 42 metres above the River Thames. Two weeks after its November opening, a tourist shattered a layer of glass in one of the panels when he dropped a beer bottle. Yikes.

## Quote Unquote



"I'M NOT PERFORMING WITH A F.....G CHIMP SITTING NEXT TO ME EVERY NIGHT!"

FREDDIE MERCURY  
MUSICIAN

In a newly released book, showbiz writer David Wigg revealed why a rare duet between Mercury and pop legend Michael Jackson, remained unfinished since the 1980s. The pair was supposed to record a single called "There Must be More to Life Than This". But, Bubbles, MJ's pet chimp was present in the studio! Wigg writes: "Freddie got very angry because Michael would turn to Bubbles and ask,

'Don't you think that was lovely?' or, 'Do you think we should do that again?'" Eventually, Mercury could take no more and abandoned the project.

BAD PETS TO  
BRING INTO THE  
RECORDING  
STUDIO, RANKED

LOVELY A  
SLEEPY KITTEN

ANNOYING A PARROT  
WITH TOURETTE'S  
SYNDROME

UNHYGIENIC AN  
INCONTINENT  
CHIHUAHUA

DEADLY A SWARM OF  
AFRICANISED BEES

PHOTOS: GETTY IMAGES (SKY WALKWAY); FREDDIE MERCURY; CPI (FUTURE OF FLYING); ALATRIEL ELENAR (LEGO SET); JASON PAUL (NAKED PARKOUR)



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## THE EYE OF THE BEHOLDER



AS YOU'VE  
NEVER  
SEEN THEM  
BEFORE

# SIX WONDERS OF THE WORLD, WITH A TWIST

Sometimes you have to take a step back to really appreciate a view



## THE PYRAMIDS OF GIZA

We picture the ancient, mystical Egyptian pyramids in isolation, out in the murky desert. The truth is that they overlook Giza, a turbulent city brimming with some eight million souls.



## NIAGARA FALLS

A natural beauty the falls may be, but not at night, when they're lit up like a Christmas tree by the overlooking hotels. Which we really hope are soundproofed. Can you imagine sleeping next to that watery din?



## STONEHENGE

Ah, the prehistoric ruins of England! Mystical, beautiful — and with a freeway at its door. As seen from Google Maps, the iconic prehistoric standing stone circle has the A303, a multi-lane highway, beside it.



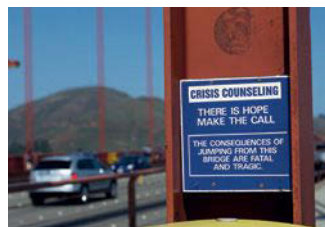
## CENTRAL PARK

A stunning shot that reminds you just how, er, central (and huge) New York City's finest park is. Fun fact: at 843 acres, Central Park is only the fifth-biggest park in the city. The largest is Pelham Bay Park in the Bronx, at 2765 acres.



## THE GREAT WALL OF CHINA

Does the wall begin or end? Usually it's pictured against mountains. But the wall does end, at Lao Long Tou or Old Dragon's Head, which meets the sea in China's Hebei province.



## GOLDEN GATE BRIDGE

Every two weeks or so, a person attempts to kill themselves by jumping off this San Francisco landmark, which opened in May 1937. Hence why pedestrians are confronted with phone signs saying: "There is hope. Make the call."

## Quote Unquote



"HALF THE  
CONFUSION IN  
THE WORLD  
COMES FROM  
NOT KNOWING  
HOW LITTLE  
WE NEED"

## ADMIRAL RICHARD E. BYRD

Nice words, there. Do they seem a little trite, maybe like those motivational posts that so often pop up on your Facebook feed? They shouldn't. This explorer had his realisation after spending five months alone in a shack in the middle of the Antarctic, shivering in temperatures as low as 60 degrees Celsius below zero. Byrd recounted his ordeal in his book, creatively titled *Alone*, noting that it was so cold that "you can hear your breath freeze as it floats away, making a sound like that of Chinese firecrackers". That's the kind of poetic description you come up with when there's nobody to distract you. As is this: "What I had not counted on was discovering how closely a man could come to dying and still not die, or want to die."

PHOTOS: CORBIS (MAIN, STONEHENGE); GETTY IMAGES (PYRAMIDS OF GIZA); OHIO STATE UNIVERSITY ARCHIVES (ADMIRAL RICHARD E. BYRD)



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SOMEONE HAD TO BE FIRST

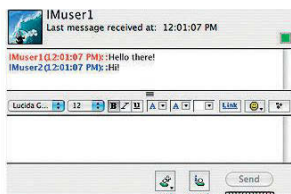
# THE MATCHUP: TECH FIRSTS

INTERNET



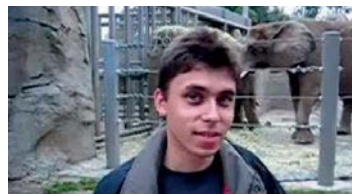
## BLOG

Justin Hall began writing at "Justin's Links from the Underground" ([www.links.net](http://www.links.net)) in 1994, offering a guided tour of the Internet. He amassed a loyal following — and he's still at it.



## INSTANT MESSAGING

AOL Instant Messenger launched in 1997 popularising communication in real time. The first message was by Ted Leonsis to his wife: "Don't be scared...it is me. Love you and miss you."



## YOUTUBE

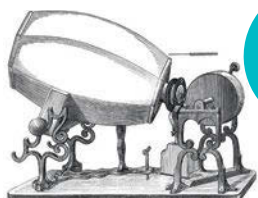
Co-founder Jawed Karim uploaded the first YouTube video on April 23, 2005. The clip runs 19 seconds and shows a bashful Karim hanging out near the elephant enclosure at San Diego Zoo.



## Chopsticks to save lives...

These smarties detect toxic oil!

Baidu, a company often referred to as "China's Google" recently unveiled a prototype: smart chopsticks. Embedded with sensors, they can detect whether the food was produced with potentially toxic cooking oil — a common problem in China. **Future models may warn you of contaminated water, measure calories and flag up high salt levels.** Results are beamed back to your smartphone device — hopefully before you finish your meal, rather than sending a grinning skull and crossbones while you're happily digesting. It might help if the chopsticks detected drugs, too. A restaurant owner in China's Shaanxi province was recently caught lacing his noodles with opium to keep customers coming back.



MUSIC

## RECORDED SONG

A phonautograph recorded a French folk song "Au Clair de la Lune" in 1860. The machine was actually designed to record sounds visually but scientists in 2008 unearthed the creepy ditty.



## ON RADIO

On Christmas Eve in 1906, Canadian inventor Reginald Fessenden broad-casted possibly the first ever song played on radio: "O Holy Night", a violin solo that he performed.



## ON MTV

The first song to ever air on MTV was "Video Killed the Radio Star" by The Buggles on 1 August 1981. That was before MTV stopped caring about music and just broadcast The Hills 24/7.

GAMES



## VIDEO

In 1947, Thomas T. Goldsmith Jr., and Estle Ray Mann constructed the Cathode-Ray Tube Amusement Device, a missile simulator game, after being inspired by WWII missile displays.



## VIOLENT

Chiller was the first game produced in 1986 that allowed arcade-goers to maim, mutilate and torture helpless victims. Unsurprisingly, countries such as the UK banned it — permanently.



## LIFE SIMULATION

Little Computer People appeared in 1985 and involved poker playing and letter writing. The Commodore 64 version was available in the form of a floppy disk and a cassette. Wait, what?



TOP THREE WINNERS

## FIRST AIM MESSAGE

"This is so cool," his wife replied. Which is cool of her to say, considering her hubby's message sounded like he was coming from beyond the grave (say it in a ghostly voice and you'll see).



## PHONAUTOGRAPH RECORDING

It's spookier than "Stairway to Heaven" played backwards. What's more, this recording predates Thomas Edison's phonograph recording by two decades.



## FIRST LIFE SIMULATION

The box says: "Little people have been living inside computers for years, playing tricks on computer owners, but remaining hidden from view. Now they have been tempted into the open."





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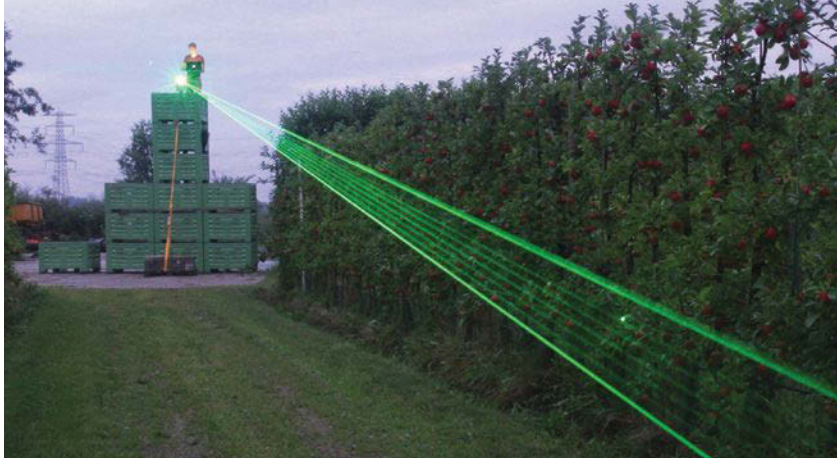
*Touching Every Indian Home*



## ROASTED CHICKEN

# BIRD BOMBS

There are more reasons to be worried about birds than their poop!



Take the annoyance you feel when a pigeon poops on your head, and multiply it by ten. Birds are a huge problem across many industries — they get caught in aircraft engines, decimate crops, pollute animal feeding troughs. A 2005 study showed that 300,000 birds die a year in collisions with the pipes and wires of offshore oil rigs. Last year, the world's largest solar plant, boasting 350,000 superheated mirrors, opened in the Mojave desert in the United States. On the plus side, it powers 140,000 homes annually. On the downside, it's thought to kill a bird every two minutes, literally roasting it out of the air. Luckily, Dutch entrepreneur Steinar Henskes is on the case. He's developed green laser beams that startle the birds away harmlessly, and works in an area of up to 13 square kilometres. So far 46 countries have bought his products. You don't have to be a birdbrain to see why.

**US\$  
1.2 billion**

The cost of bird strikes to the aviation industry alone per year

**1960**

During his 25<sup>th</sup> lap of the Belgian F1 Grand Prix, driver Alan Stacey is struck by a bird, causing him to crash and die instantly.

**90,000**

Number of birds that die from crashing into windows each year in New York City

## Quote Unquote



DOUGLAS ADAMS  
AUTHOR

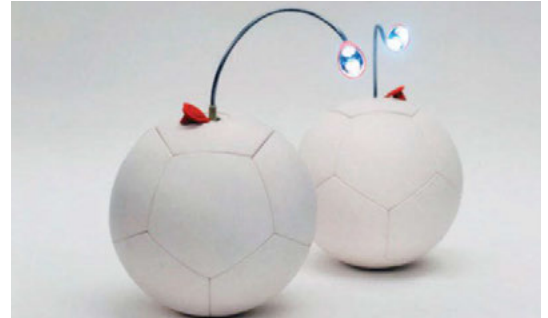
"First we thought the PC was a calculator. Then we found out how to turn numbers into letters with ASCII — and we thought it was a typewriter. Then we discovered graphics, and we thought it was a television. With the World Wide Web, we've realised it's a brochure."

The sci-fi legend behind the ludicrously funny *Hitchhiker's Guide to the Galaxy* is right about the

versatile PC. Alas, it's not as versatile as Adams' own fictional e-book to the entire universe. Frankly, we want one. Not just because it will make you want to travel the galaxy far more than *Interstellar* did. Not just because it comes with a cover soothingly emblazoned with the words "DON'T PANIC". Rather, because it is the perfect traveller's guide. Here, for example, is its summary of Planet Earth: "Mostly harmless."

# Dance Away to Harness Energy

Five power tools to save the planet



**Bike Paths** One just opened in the Netherlands made entirely from solar panels. At 70 metres long it costs US\$3.7 million — and if it gets covered in dirt and snow may not be that efficient. But it's a start. Imagine if all roads generated solar power. The US has 78,000,000 square kilometres of roads that could generate three times the amount of electricity that the country uses.

**Cost** US\$3.7 million

**Footballs** Soccket is a ball that generates stored kinetic energy from your kicks. For every 30 minutes of play it can power an LED lamp for 3 hours. In developing countries it could reduce dependence on harmful and dangerous kerosene lamps.

**Cost** US\$99

**Dancefloors** The company Sustainable Dance Floor rents or sells floors powered by the dancers themselves.

**Cost** Around US\$300 for a small unit

**Pollution-sucking** Designers have created concept "parasitic robots" which they plan to perch on Hong Kong's neon billboards. During the day the bots will suck pollution from the air. At night they will run off heat generated from the neon billboards.

**Cost** Unknown at the moment

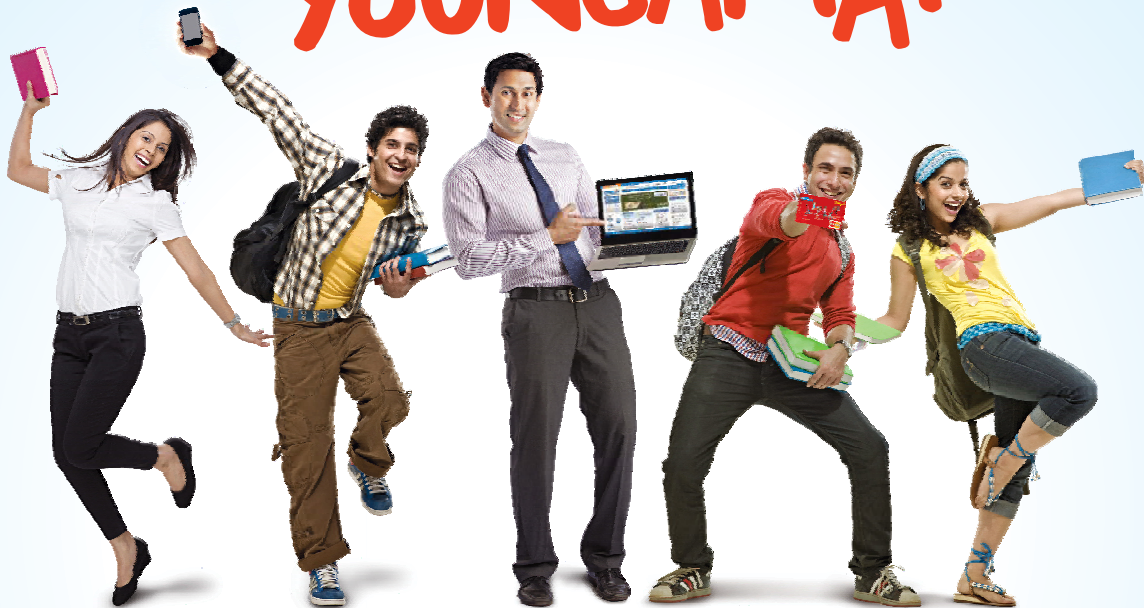
**Footsteps** Ampy is a wearable gadget, hopefully shipping in early 2015. It turns your footsteps into battery life for your smartphone, with 10,000 steps equalling three hours of power.

**Cost** US\$95





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PHONES, TRAINS AND CREAM PIES

# OF PIE-FACED CHILLS...

Four films that invented moments you never knew you knew



## BLACK CHRISTMAS (1974)

INVENTED "THE CALLS ARE COMING FROM INSIDE THE HOUSE!"

What was our first clue that this slasher flick, featuring a crazed killer terrorizing a group of sorority girls? Probably when the police Sergeant bawls, "Jess, the caller is in the house. The calls are coming from inside the house!"



## MR FLIP (1909)

INVENTED THE OLD "PIE-IN-THE-FACE" GAG  
The four-minute film, set in a general store, starring Ben Turpin, kicked off a love affair for this trope. Filmmaker Mack Sennet became known for using the gag in his films in 1910s, codifying a rule: "A mother never gets hit with a custard pie... Mothers-in-law, yes." Laurel and Hardy were obsessed with it, in the 1927 film *Battle of the Century* they flung up to 4,000 pies.

Hitchcock didn't mind heights, but was terrified of eggs, sputtering: "Have you ever seen anything more revolting than an egg yolk breaking and spilling its yellow liquid?"



## SINCE YOU WENT AWAY (1944)

INVENTED THE TRAIN STATION GOODBYE

You know, where the soldier gets shipped out and his beau runs tearfully after the train? It might seem a cheesy way to say goodbye now, but when this film was released during World War 2 it was a common event for millions of women, many of whom were sending off husbands and sons to die.



## VERTIGO (1958)

INVENTED THE DOLLY ZOOM

A camera move that mirrors sickening realization, it involves zooming in with the camera whilst simultaneously moving it physically backwards, making the backward appear to fall away nauseatingly. It was used to great effect in *Jaws*, *Raging Bull*, *Poltergeist*, *Ghostbusters*, *Goodfellas*, *E.T.*, Michael Jackson's *Thriller* music video and a bajillion other movies.



# The Crazy Killer

Shooting peasants for fun, anyone?

An oft-repeated story about Ludwig II, the King of Bavaria from 1864 to 1886, seems to prove his insanity. Ludwig's hobby was to shoot a peasant a day, a habit that grew so disconcerting that his attendants came up with an idea. They loaded his gun with blanks, and the victim would artistically play-act their death, satisfying the king for another day.

But now, historians wonder whether Ludwig was that crazy. One theory is that he was diagnosed "insane" by government ministers who disliked the vast amounts of money he spent on construction. (Ludwig had recently built Neuschwanstein, the fairytale castle copied for Walt Disney's Sleeping Beauty.) Three days after he was deposed, the king was found drowned in a lake. So is the crazy story true, or the product of a smear campaign?

Because madness, it seems, also ran in the family — Princess Alexandra, Ludwig's aunt, suffered from the delusion that she had swallowed a grand piano made of glass, and thus had to walk very carefully lest she shatter. "Glass delusion" was so common that it was noted by baffled doctors back in 1621. King Charles VI of France, born in 1368, suffered from it so seriously that he had iron bars sewn into his clothes as a protective measure.

# Skinny Coffin

You're probably saying, "Is that a coffin for a snake?" That's exactly right, you budding Egyptologist, you. The Egyptians didn't just mummify humans, but snakes, baboons, and cats. Stored at the Brooklyn Museum, this gorgeous artifact could be around 2,500 years old, and once



held a mummified reptile. The cobra figure is one of many representations of Ra, the sun god. Ra had different incarnations depending on the time of day. Khepri, representing the morning aspect, was shown as a scarab beetle who pushed the

rising sun up across the heavens. Re was the noontime sun, often shown as a falcon with a sun disk over his head. Atum (seen at left), represented the setting sun, and was either shown as a cobra-headed human, or a weary old man. Yet with all that fascinating history, all we can think is this: damn that really looks like a great box for storing pencils.

## THE MUMMY RETURNS

### KING CHARLES II

The French monarch rubbed powdered mummy dust over his body, in the hope that their "greatness" would rub off

### SPARE PARTS

If clumsy priests knocked off fingers or toes of a body during mummification, they would replace them with a piece of wood

### MACBETH

Witches in Shakespeare's play create a brew that includes "Witches' mummy, maw and gulf." Mummy parts were used as medicine for millennia



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# BANKNOTES

Let's take a walk through the history of money.

*Top Tip if you want to pass a drug test, don't lick a US dollar bill*

1



## EARLY BANKNOTES

Paper money had its beginnings as jiaozi, which were officially issued in China during the Song Dynasty from AD 960 to 1276. The Song government even established an early central bank to print, authorise and issue money. Jiaozi also included multiple cash seals to prevent counterfeiting.

2



## CREATIVITY

Norway's central bank unveiled a series of new banknotes that many are calling works of contemporary art. The notes feature pixelated depictions of the coastline and traditional designs that tastefully showcase Norwegian heritage, like a snazzy Viking ship.

3



## CONTAMINATED

Ninety percent of US dollar bills are tainted with cocaine. Of the banknotes from 17 cities studied and tested, Washington DC emerged top with 95 percent found to contain the drug. Ironically, a war on drugs was declared in this state 43 years ago.

4



## INDIAN 1 RUPEE NOTE

The Indian Re 1 notes were issued by the Government of India while all others are issued by the Reserve Bank of India. Why? Because the Government of India, not the Reserve Bank of India, is responsible for minting and circulating coins, and Re 1 notes issued under Currency Ordinance, 1940, are included in the expression "Rupee coins".

5



## ZIMBABWEAN DOLLAR

In 2009, Zimbabweans paid 300 billion for a loaf of bread. Crazier still, the government issued a \$100 trillion note (Yes that's 14 zeros) to combat hyperinflation, recorded at 231 million percent. In 2013, a minister announced its government bank held just US\$217.

6



## EMERGENCY MONEY

Notgeld, German for "emergency money", was issued during WWI in Germany to counteract hyperinflation and the shortage of coins (metal was needed for war). Alas, it wasn't an effective solution. The notes were so quirky and colourful that people started collecting them.

## An Enterprising Beggar

"PLEASE RETURN THIS BILL TO ME. I AM VERY POOR." DON'T BE SURPRISED IF YOU SEE THIS NOTE SCRIBBLED IN BRIGHT RED ON A US DOLLAR BILL, WITH AN ADDRESS TO A HOUSE IN PHOENIX, ARIZONA. AND ODDLY ENOUGH, PEOPLE DO JUST THAT. OVER THE YEARS, AN ARIZONA RETIREE NAMED GARY HAS HAD A STEADY FLOW OF ABOUT US\$2 A DAY TRICKLING BACK TO HIM. HE ONLY SCRIBBLES ON US\$1 BILLS, FIGURING THAT MOST PEOPLE WON'T MISS RETURNING SUCH A SMALL AMOUNT. IT SEEMS TO BE WORKING.





# SATPURA NATIONAL PARK

**Tucked away in the serenity of Satpura mountain ranges, Satpura National Park rests in Hoshangabad district of Madhya Pradesh. Set up in 1981, the park borrows its name from the Satpura hill ranges (Mahadeo Hills). An important wildlife sanctuary of India, the park shelters a rich biodiversity amidst its terrains. The Panorama of the place, coupled with its herbaceous surroundings, makes it an ideal abode of many wildlife species of the country. The Park has a jugged landscape, embedded with plain lands, and the altitude of the place ranges from 352 m to 1352 m.**

## Landscape and Flora

The landscape of Satpura Park is a veritable haven reflecting aspects of natural splendour, with rocky sandstone peaks complemented by deep and dramatic ravines. The dense forest undulate with all its verdure and remains interspersed with some rare bryophytes and pteridophytes. Central Indian mixed deciduous vegetation is common in most of the areas. There are abundant Sal, Teak, Tendu, Aonla, Mahua, Bel and Bamboo trees that add to the wealth of flora in the park. Grasses and plants with therapeutic and medicinal properties are also found in abundance.

## Fauna & Avifauna

The Satpura National Park is a rare and exciting jungle treat. Its fauna comprises of animals like Tiger, Leopard, Sambar, Chital, Bhedki, Nilgai, Four-horned Antelope, Rhesus Monkey, Chinkara, Bison, Wild Boar, Wild Dog, Bear, Black Buck, Fox, Porcupine, Flying Squirrel, Mouse Deer and Indian Joint Squirrel, to name a few. There is also a huge collection of birds, about 254 species. Birds like Malabar Pied Hornbills, Crested Serpent Eagles, Crested Hawk Eagles, Honey Buzzards, Paradise Flycatchers, Thrushes, Peafowl and Pheasants contribute to the varied avifauna of the park.

## Tawa Reservoir

Tawa Reservoir is a large reservoir on the Tawa River in Central India. Located in Hoshangabad district of Madhya Pradesh, the reservoir was formed by the construction of the Tawa Dam, which began in 1958 and was completed in 1978. The dam provides water for irrigation to several thousand hectares of farming land in Hoshangabad and Harda districts. Tawa Reservoir is also a big tourist attraction.

The Tawa Resort, an exotic resort of MPT, is an ideal place for breaking away from the routine life of cities. The view from the Tawa Resort is soothing to the mind and soul. M.P Tourism in collaboration with M.P Ecotourism Development Board offers river wildlife safari for tourists travelling from Tawa to Madhai, through a river passage in a mini cruise boat, 'Jalpari'. The other Cruise 'Satpura Queen' takes you around the Tawa reservoir and the trip takes about 45 minutes.

**HOW TO REACH :** Distance from Pachmarhi to Tawa is 175 kms, Bhopal to Tawa is 115 kms, Itarsi to Tawa is 30 kms and Hoshangabad lies mid-way on the Pipariya – Bhopal route (75 kms from each)

**CONTACT :** 07572-273017

**E-MAIL :** tawa@mptourism.com





## MADE WHERE?

Most of the iconic products we think of as originating in a particular place have a surprising origin, either in terms of where they were invented or made. Think London cabs are made in London? Think again



**“Chinese” fortune cookies** were invented by an American; as was the rickshaw

Chicken tikka masala was invented in Glasgow, Scotland

Most **baseballs** used in Major League Baseball games in the USA are produced in Costa Rica



Asian factories where he is produced



**International calls** iPhone software is made in the USA. The “rare earth materials” that form the components are mined notably in Mongolia. The chips and touchscreen components come from Japan, Korea and Taiwan. A French-Italian company manufactures the iPhone gyroscope, and the whole package is assembled in China

A third of the **frozen French Fries** produced in the world are made in Canada



Say dankeschoen to **Merci chocolates** — they are made in Germany, not France

All **London cabs** you see driving around



outside of the UK have been made in China

**Chicken tikka masala** is an “Indian” curry made from spices and tomato sauce, consistently voted one of the UK’s best-loved dishes. Sadly, it’s about as Indian as haggis.

**GI Joe** may bark that he’s “a real American hero”, but his allegiance might lean more towards the



Each country makes their own **currency**? Apparently! Since opening in 1908, the Canadian Mint has produced coinage for 73 countries, from Algeria to Zambia, and is still going strong. On the paper side, a German company produces banknotes for 60 countries worldwide.

## Electric Webs

All charged up to trap prey!

See that spiderweb up there? There’s something special about it. In fact, there’s something special with all spiderwebs. They seem to work on a principal that is so obvious, we haven’t bothered to think about it anymore: spiderwebs are sticky, insects fly into them and get stuck. Bingo, it’s lunchtime for the eight-legger with an appetite. But only last year researchers at the University of California at Berkeley found out that something more was going on. When they fly, many insects attain an electrostatic charge, picked up simply by flapping their wings against the air. And this charge makes the web pull towards the prey, creating a more effective trap. In essence, they’re like alien tractor beams pulling in their helpless victim.



## Charged for life!

Energising the world?

HALLELUJAH! SINGAPORE RESEARCHERS AT THE NANYANG TECHNOLOGICAL UNIVERSITY HAVE DEVELOPED **A LITHIUM ION BATTERY THAT WILL RECHARGE THE WORLD**. THAT’S THANKS TO THEM USING TITANIUM OXIDE INSTEAD OF GRAPHITE ON THE ANODE (THE ELECTRODE THROUGH WHICH ELECTRIC CURRENT FLOWS) WHICH SPEEDS UP THE CHEMICAL REACTIONS THAT PRODUCE ENERGY. WHAT DOES ALL THIS MEAN? IT CHARGES TO 70% POWER IN A NIPPY TWO MINUTES, AND YOU WON’T HAVE TO REPLACE THE BATTERY ITSELF FOR ABOUT 20 YEARS. NOW SMARTPHONE USERS AND ELECTRIC CAR DRIVERS JUST HAVE TO WAIT UNTIL THEY HIT THE MARKET — IN ABOUT TWO YEARS. CAN’T ESCAPE THOSE LOADING TIMES, IT SEEMS.



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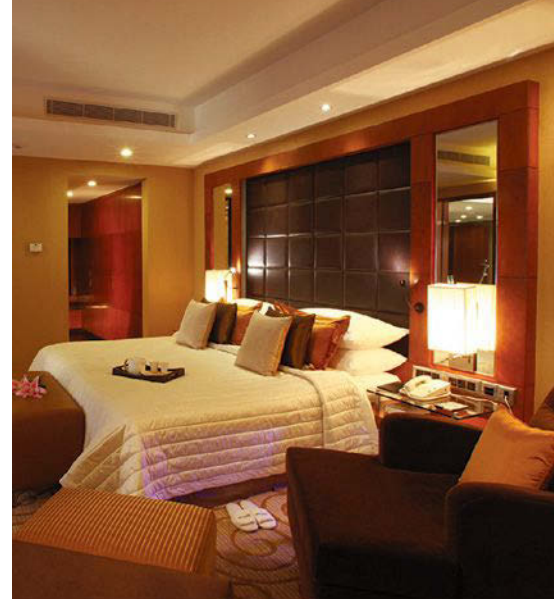


Welcome to the all new Radisson Blu Plaza. Located right next to the spanking new Terminal 3, in addition to newly renovated rooms with an elegantly extended Plaza Lounge and gorgeous bigger Banquets along with a swish new Thai Restaurant - Neung Roi and an Avant Garde Bar - The Orb; we have a whole host of service facilities to enhance your stay with us. Ranging from Complimentary Internet, Late Checkout, Grab & Run, One Touch Service, Business Class Rooms to an Express Checkout, you'll find we have everything that a demanding traveller like you needs. Enjoy Delhi's only 3 level spa - R The Spa, NYC - the 24 hour global coffee shop, the famous The Great Kabab Factory, R The Lounge - the perfect meeting place, and the elegant Savannah Bar. Check in Soon!



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SIDES OF



# SMELL

Time to stop and smell the roses. And possibly meet a toad that makes you think, "I need a sandwich"

This year scientists revealed your nose can pick up one trillion odours, far more than previously thought, which was a mere 10,000 odours — 100 million times fewer than reality



Animals that give off delicious odours

**Binturong** an Asian bearcat that smells like buttered popcorn

**Spadefoot toad** secretes a peanut butter smelling substance that alas, burns your eyes

**Male giraffes** described by early explorers as smelling of "a hive of heather honey in September"

**Petrichor** the scientific name for the gorgeous smell of the earth after a rain shower.

(From the Greek *petra*, meaning stone; and *ichor*, for the liquid that flows in the veins of Greek gods)



Wake Up and Smell the Bacon — this is by far the coolest iPhone app, agreed. But, imagine one with *parathas* and warm, melting butter!

The smell of you-know-what synchronised with your morning alarm. Mmmm...better?



You can always see your nose — it's just that your brain filters out this pointless information. Ten bucks says this fact just made you cross your eyes

Polynesians on the island of Tuvalu greet each other by pressing their nose to the cheek and taking a nice, deep sniff



The honey badger is one of the world's fiercest animals — especially for bees. It "fumigates" hives by filling them with noxious secretions from its anal glands, then tucks into honey when the bees flee



"Old person smell" is a real thing, caused by a chemical in ageing skin glands called 2-nonenal

Jorvik Viking Centre in York in the United Kingdom pipes in authentic scents of the era to museum visitors. One five-star TripAdvisor review beamed, "It smells like poo — on purpose!"



Fact: there has never, ever, in the history of television, been an ad for perfume that did not make you want to gag like a visit to Jorvik Viking Centre



Your armpits can become immune to the ingredients in your deodorant. You should switch brands every six months to prevent resistance



Love the smell of freshly cut grass? That's actually the plant's distress signal. You're basically sniffing gleefully while millions of beheaded victims wail, "Whyyy!"





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## FINE DINE

## SOMM LIKE IT FANCY

What was Kavita Faiella thinking when she quit medical school? The celebrated sommelier shares it with Adii Dande



KAVITA FAIELLA

“For me, the best isn’t the most expensive and luxe. Best wines are those that come with a story – small productions’ wines, crafted by passionate wine makers whose ultimate objective is to express the terroir,” says sommelier Kavita Faiella, who quit medical school to join the world of wines, and hasn’t regretted the decision ever since. After working with top Australian chefs, Stefano Manfredi and Neil Perry, she made Asia her second home, working in Maldives first and then moving to Delhi to work as the regional cellar master for Aman Resorts.

“The stories behind the labels pull me towards wines. I love learning about the winemakers who craft them, the places they come from, and understanding the differences,” shares the young sommelier, who has recently

launched her consultancy, Voyageur Selections, in Sydney, Australia.

**A TRUE WINE LOVER**

She did what she calls ‘sommeliership’, like an apprentice chef, in Sydney, and worked with noted restaurateur Tim Connell. He paid for her to study at TAFE, which was where her formal wine education began. Kavita developed her knowledge when she embarked on the Master Sommelier programme, which she recommends strongly for all those planning to get into the profession. “I always encourage aspiring sommeliers to gain certification through the Court of Master Sommeliers, as along with endless facts that one learns in the process of preparing for the exams, it also hones one’s skills and expertise.” She continues to work as a brand ambassador for wineries in the Asia-Pacific and offers unique wine programme consultancy in her sommelier guise for restaurants and hotels. She is now on her way to becoming Australia and Asia’s first female Master Sommelier.

**BEING A SOMMELIER**

The exact job depends on the kind of establishment you work for. “Usually, sommeliers work in fine dining restaurants where the role would classically involve creating and maintaining the wine list, and staff-training, so that the team is educated. Service is about understanding

the menu as much as the wine list, and of course, suggesting the right wines for guests, depending on if they are choosing a bottle or wine pairing degustation menu,” Kavita states. She adds that there are many other elements to being a sommelier – keeping up to date with trends and always educating oneself and others. She stresses that it’s equally important to be business savvy, as it is to be passionate. Wine programmes are an important part of the financial success of restaurants, and it’s important that lists are not only eclectic but also financially viable.

**ENJOYING THE PERKS**

Apart from thoroughly enjoying her job, travel is something that totally attracts Kavita. “Travelling to various regions to meet wine makers and learning about the wines in the place they come from is my favourite part,” she says. Plus, there are many other fun things that a sommelier can do – wine judging, writing and blogging are just a few options.

Kavita was named as one of the 10 most influential wine personalities in India by CNN, and 20 most influential people in the Hong Kong food and beverage scene by *Time Out*.

Working in India had its goods and bads. “The market is still very young and many ideas that I tried to introduce were probably a bit too premature. But the upside of working in a burgeoning wine country is that everyone is open to learning, and for me,

this was one of my favourite things about working in India,” she shares.

**THE WINE CAREER**

If you love wine and wish to make a career of it, simply telling a Cabernet Sauvignon from a Sauvignon Blanc will not suffice. An obsessive love for wines and the enthusiasm to spread this love is what it takes to be the best. Being a successful sommelier involves a combination of both, training and firsthand experience. Kavita explains that globally, one of the best forms of certification that is recognised around the world is WSET. “There are several Wine and Spirit Education Trust (WSET) programmes run in India and I would recommend these to aspiring sommeliers as a way to build knowledge, along with self study,” she suggests. The best thing about them is that they aren’t full time; so one can study and work simultaneously.

“Just stick with it!” she advises, “Educate yourself, enroll in as many courses as possible and put what you learn into practice. One of the best ways to educate yourself is to teach others. So, if you are already working as a somm, be sure to train those around you. Travel as much as possible and do work overseas if possible – work in a winery during harvest, polish glasses in a Michelin star restaurant – all the experience you can get is valuable.” “And then, come back to India and help foster the wine drinking community in your wonderful country,” she smiles.

**KAVITA'S FAVOURITES**  
(also available in India)  
Jacquesson Champagne (France)  
Fritz Haag Riesling (Germany)  
Passopisciaro Nerello Mascalese (Italy)  
Ata Rangi Pinot Noir (New Zealand)  
Achaval Ferrer Malbec (Argentina)

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MUST-HAVES**

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- ABILITY TO READ YOUR GUESTS
- FORMAL CERTIFICATION
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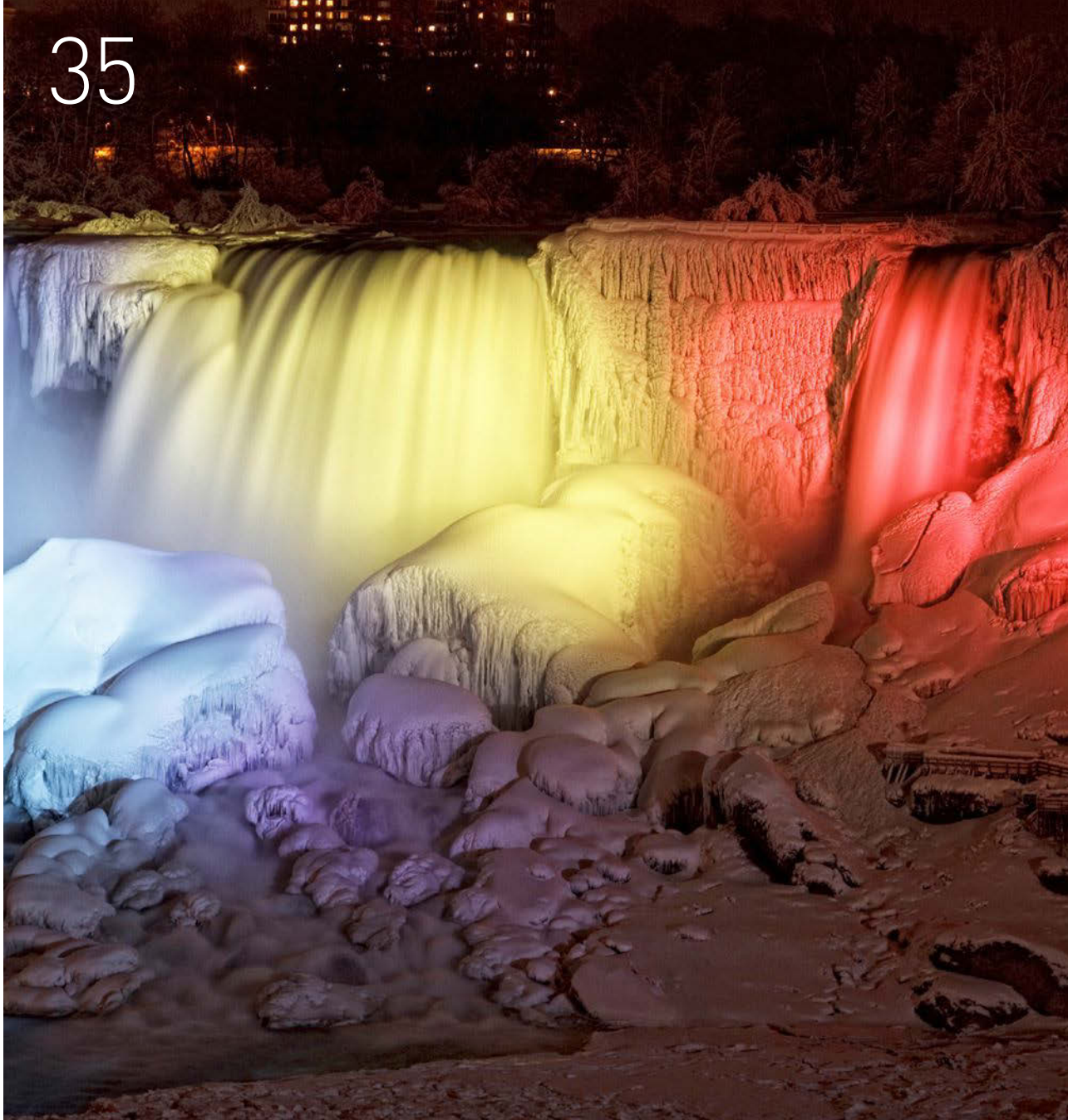
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# A YEAR OF

UP, CLOSE  
AND  
BEAUTIFUL

A COUPLE SEALS IT WITH  
A KISS AGAINST THE  
SUPERMOON OR HARVEST  
MOON, IN SEPTEMBER 2014,  
IN SYDNEY, AUSTRALIA.  
THIS PHENOMENON  
INVOLVES A FULL MOON  
COINCIDING WITH IT'S  
CLOSEST APPROACH  
TO EARTH ON IT'S  
ELLIPTICAL ORBIT

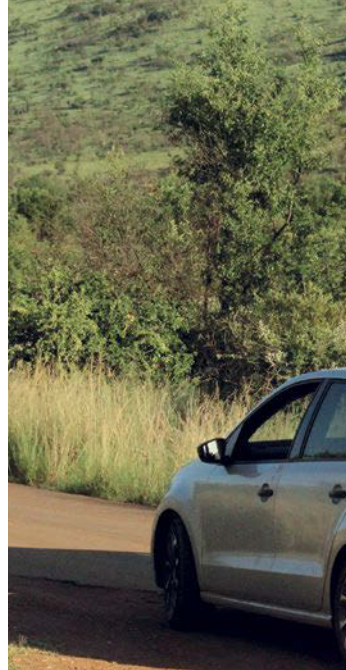


1ST  
ANNIVERSARY  
SPECIAL

# DISCOVERY

**FROM THE ROMANTIC SUPERMOON TO THE SPECTACULAR AURORA, WITH A TRENDSETTING SELFIE AND A BEEFED-UP CHOCOLATE BOY, THIS WAS A YEAR OF VISUAL EXTRAVAGANZA. ON THE FIRST ANNIVERSARY OF *DISCOVERY CHANNEL MAGAZINE INDIA*, WE BRING YOU THE YEAR THAT WAS, IN PICTURES**





## ▼PLAY BALL

A SUMATRAN TIGER CUB PLAYS IN THE LONDON ZOO IN JANUARY 2015. IT IS ONE OF THE THREE CUBS BORN IN THE ZOO IN 2014. SUMATRAN TIGERS ARE THE MOST CRITICALLY ENDANGERED SPECIES OF TIGERS. ACCORDING TO THE WORLD WILDLIFE FUND, WE ARE LEFT WITH ONLY CLOSE TO 400 SURVIVING TODAY

## ►JUMBO ITCH!

WHILE THE UNSUSPECTING OCCUPANTS OF THE CAR GOT A SCARE OF THEIR LIVES, THIS ELEPHANT DECIDED IT WAS THE PERFECT POST TO RELIEVE AN ITCH AT THE PILANESBERG NATIONAL PARK, SOUTH AFRICA, IN AUGUST 2014. FROM TRUNKING THE CAR TO GOING ASTRIDE, THE PACHYDERM DID IT ALL!



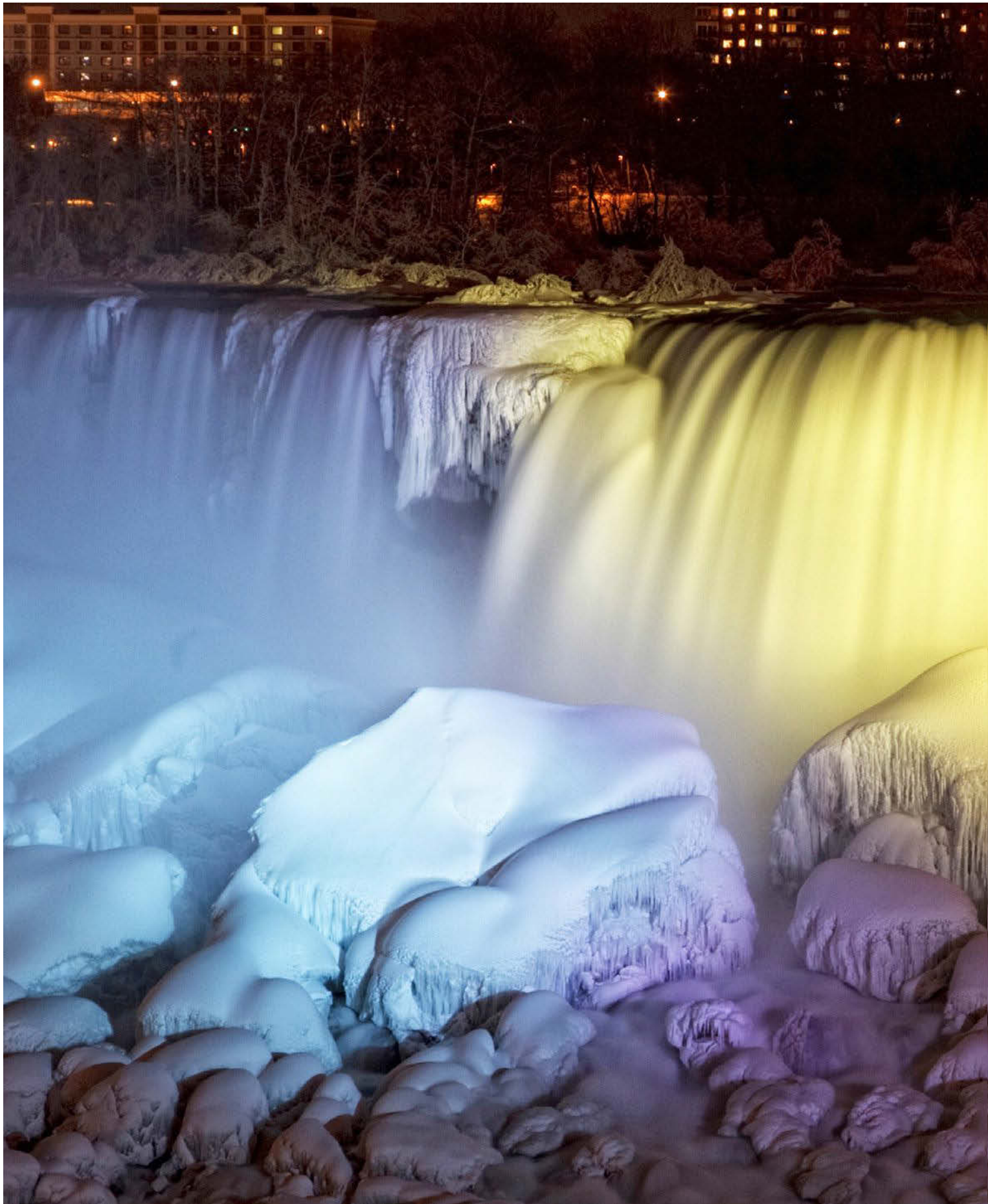
PHOTO CORBIS

PHOTOS BARCRAFT INDIA













## FROZEN IN MOTION

THE MIGHTY NIAGARA FALLS, WITH THEIR 6 MILLION CUBIC FEET OF WATER, CAME TO A FREEZING HALT IN JANUARY 2014 AND AGAIN IN MARCH 2014, WHEN THE TEMPERATURE DROPPED TO -12.7 DEGREES CELSIUS. THE FALLS HAVE BEEN RECORDED TO BE FROZEN ONLY SIX TIMES IN THE PAST







## ◀ LOST AND FOUND

A 5,000-YEAR-OLD CITY WAS DISCOVERED ON DECEMBER 28, 2014, UNDER THE NEVSHEHIR FORTRESS NEIGHBOURHOOD IN TURKEY'S CENTRAL ANATOLIAN PROVINCE OF NEVSEHIR, WHICH IS FAMOUS FOR FAIRY CHIMNEY ROCK FORMATIONS. THE 7 KILOMETRES-LONG CITY CONTAINS WATER CHANNELS, ESCAPE GALLERIES AND HIDDEN CHURCHES

## ▼ FRAMED!

ACTOR ELLEN DEGENERES GAVE THE SELFIE SUPERSTAR STATUS WITH THIS PICTURE TAKEN AT THE 86TH ACADEMY AWARDS IN MARCH 2014 AT THE DOLBY THEATRE IN HOLLYWOOD, CALIFORNIA. THE NEW ART OF PICTURE-TAKING HAS SINCE SPAWNED CUSTOM-MADE GADGETS, INCLUDING SELFIE CELLPHONES, CAMERAS AND "SELFIE STICKS", AND PAVED A NEW AVENUE TO EXPLORING SELF WORTH



PHOTOS GETTY IMAGES

## ▼ POUNDING THE SURF

IN OCTOBER 2014, HURRICANE SIMON CREATED 5-7 FEET WAVES AT NEWPORT BEACH, CALIFORNIA. SURFERS RODE THE SWELL THAT INCESSANTLY POUND THE SHORES

## ► MARATHON ON ICE

A RUNNER IN THE 10TH BAIKAL ICE MARATHON, RUNS ON THE FROZEN SURFACE OF THE WORLD'S LARGEST FRESH WATER LAKE, IN MARCH 2014, IN SIBERIA











## MIRACLE MOUNTAIN

SEPTEMBER 2014 SAW A SPECTACULAR  
DISPLAY OF NORTHERN LIGHTS  
SURROUNDING THE MOUNTAIN KIRKJUFELL  
IN ICELAND. THE PHENOMENON, ALSO  
KNOWN AS AURORA, TAKES PLACE WHEN  
ELECTRICALLY CHARGED PARTICLES FROM  
THE SUN'S ATMOSPHERE ENTER THE  
EARTH'S ORBIT AND COLLIDE WITH THE  
GASEOUS PARTICLES THERE



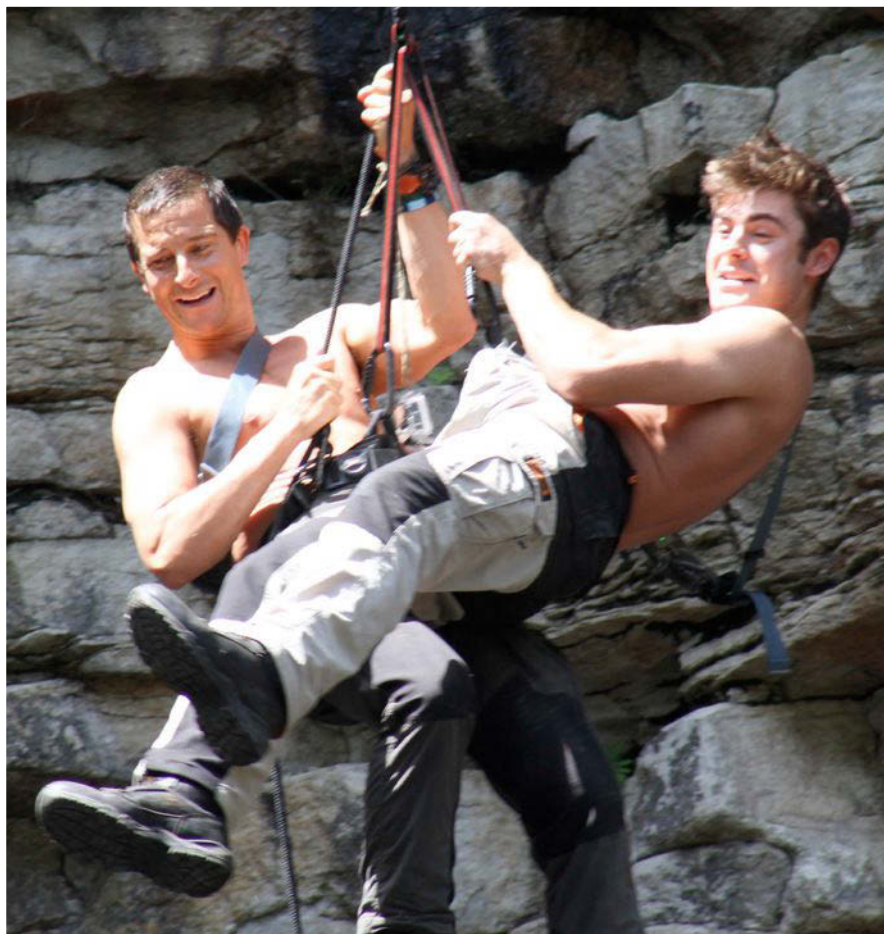
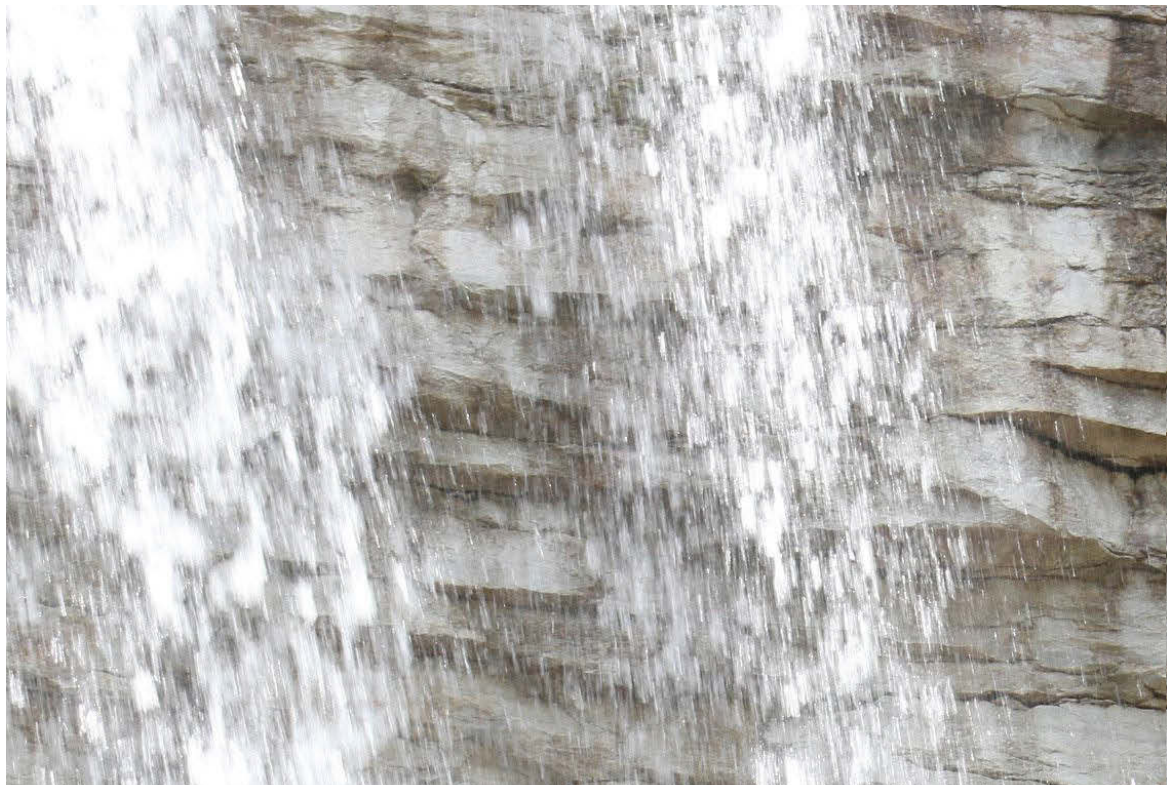


PHOTOS GETTY IMAGES



## GROWING UP!

IN JULY 2014, BEAR GRYLLS OF THE *DISCOVERY CHANNEL* REALITY SHOW *RUNNING WILD WITH BEAR GRYLLS*, CHALLENGED AMERICAN TEEN-SENSATION, ZAC EFRON, TO SOME DEATH-DEFYING STUNTS. ZAC STUNNED EVERYONE BY EATING RAW WORMS, GOING SKY DIVING SOLO AND CROSSING A RAVINE BY CRAWLING OVER A ROPE. HERE HE CAN BE SEEN RAPPELLING ALONGSIDE A GIANT WATERFALL IN THE CATSKILLS MOUNTAINS, NEW YORK. THE PAIR TOOK THIS 140-FOOT DROP, HANGING FROM A FLIMSY ROPE WITH MINIMAL SAFETY GUARD. THIS STUNT ADDED MUCH MORE TO ZAC'S APPEAL THAN HE COULD'VE EVER IMAGINED!









# THE NAKED TRUTH

A photograph of a historic building with a red-tiled roof and white arched windows, with a large explosion of confetti in the foreground.

HOW OFTEN DO WE THINK ABOUT THE CITIES WE LIVE IN AND WHAT MAKES THEM TICK? AS *DISCOVERY CHANNEL* WELCOMES A SECOND SEASON OF THE CGI ANIMATION SERIES *STRIP THE CITY*, **LUKE CLARK** LOOKS AT CREATIVE IDEAS IN ENGINEERING THAT WILL HELP US FUTURE-PROOF OUR CITIES FOR A BETTER TOMORROW









## SINKING CITY VENICE

In Venice, the two little words *Acqua Alta* have a big impact, signifying times when the city is affected by exceptional "high water" tides. During these times, the population is alerted by acoustic signals and text messages.

FREQUENCY OF  
ACQUA ALTA EVENTS

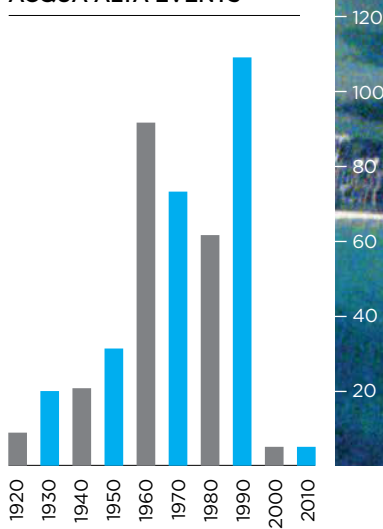






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SITTING IN A LAGOON ON THE EDGE OF THE ADRIATIC SEA, VENICE IS MADE UP OF 118 ISLANDS, CONNECTED BY OVER 400 BRIDGES. MORE THAN 16 MILLION VISITORS ARE DRAWN TO THIS ITALIAN CITY EACH YEAR. BUT WITH RISING SEA LEVELS, IT IS GRADUALLY SINKING — PARTS OF THE CITY FLOOD 250 TIMES EVERY YEAR. STRIP THE CITY INTERVIEWS LEADING ENGINEERS AND GEOLOGISTS TO REVEAL THE SECRETS THAT KEEP SAINT MARK'S BELL TOWER (PREVIOUS PAGE) FROM TOPPLING; AND EXAMINE HOW THE RIALTO BRIDGE (LEFT) IS STILL STANDING AFTER 400 YEARS

“THERE ARE EIGHT MILLION STORIES IN THE NAKED CITY. THIS HAS BEEN ONE OF THEM.” SO WENT ONE OF THE MOST FAMOUS ENDINGS IN TELEVISION, FROM THE OFT-REPEATED FILM NOIR INSPIRED TV DRAMA, *NAKED CITY*. AND INDEED, SOMETIMES EVERY CITY SHOULD GET NAKED. EVERY METROPOLIS NEEDS AN OCCASIONAL STRIPPING DOWN TO ITS BARE ESSENTIALS, BEFORE WE CAN FULLY APPRECIATE THE BEAST WE SLEEP WITH EVERY NIGHT — YET SELDOM PAUSE TO FULLY UNDERSTAND.



ow do cities work, and what factors can make them either succeed or fail? Scratching beneath the crowded sidewalks and teeming super

highways of our major cities to understand their deeper patterns is a regular task of the urban planner, architect or engineer — people whose job it is know exactly what takes place beneath us while the city sleeps. And indeed, to help us solve the potential puzzles that, if left unchecked, threaten to break our cities.

Like the most intricate of cakes, any major city has multiple layers that we need to first appreciate before we can fully comprehend its inner workings — and to borrow a ►



► well-worn phrase, to ensure we can somehow future-proof cities from the various threats that confront them.

## VENICE IS A CITY LIVING ON BORROWED TIME. AS THE FLOODING GETS MORE FREQUENT, THE CITY IS IN REAL DANGER OF BECOMING A MODERN-DAY ATLANTIS

Engineering super-structures are among the hardware layers of this future proofing — and this is the realm that *Strip the City* inhabits, as season two of the show delves into key engineering challenges confronting eight major global

cities. To do so, the series cleverly utilises state of the art CGI animation, so that we can quite literally “strip back” each location’s outer shells, to both identify the problem and focus on the solutions — in this case, science’s defence systems against the elements.

The stories from our naked cities explore fundamental questions. How can Tokyo survive sitting atop some of our planet’s most seismically-active rock? How did the ancient Incas build a city high in the Andes without modern technology? And put painfully simply, how does Italy’s jewel heritage city of Venice stay afloat?

A drawcard for 16 million visitors each year, the case of Venice is particularly pressing. “Built at sea level, the city is now sinking beneath the waves,” narrator Thom Kikot tells us. “This beautiful city is constantly fighting nature, and at the moment, nature is winning.” ►

**RIGHT** TOKYO LIVES WITH THE THREAT OF TSUNAMIS FROM THE EAST, MEGA-QUAKES EMANATING FROM KILOMETRES BELOW AND AN ACTIVE VOLCANO, MOUNT FUJI, TO THE WEST

**BELOW** THE KANTO EARTHQUAKE OF SEPTEMBER 1923 WHICH HIT JAPAN’S MAIN ISLAND OF HONSHU DESTROYED YOKOHAMA AND MAIN PARTS OF TOKYO, AS WELL AS MANY VILLAGES IN BETWEEN THE TWO CITIES



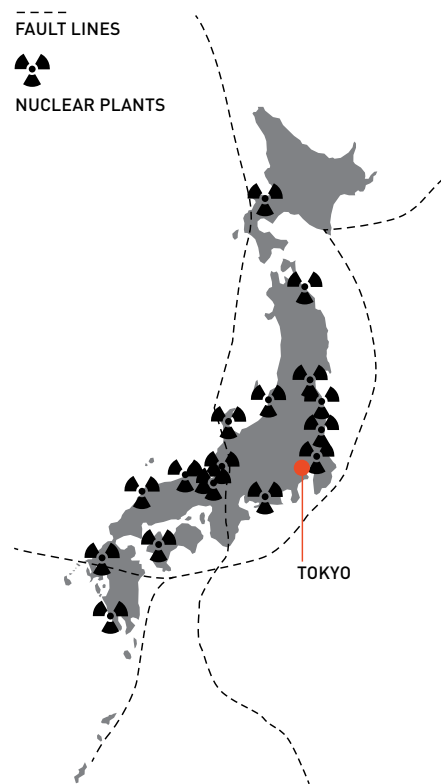


## MEGAQUAKE CITY TOKYO

--- FAULT LINES



NUCLEAR PLANTS



Several geological fault lines snake throughout Japan, which is worse news than you'd think, depending on where they occur. One of them lies directly underneath Tsuruga nuclear plant. It was recently determined that this is an active fault, which poses sufficient danger of an earthquake to close the plant down — a move that would cost some US\$650 million.

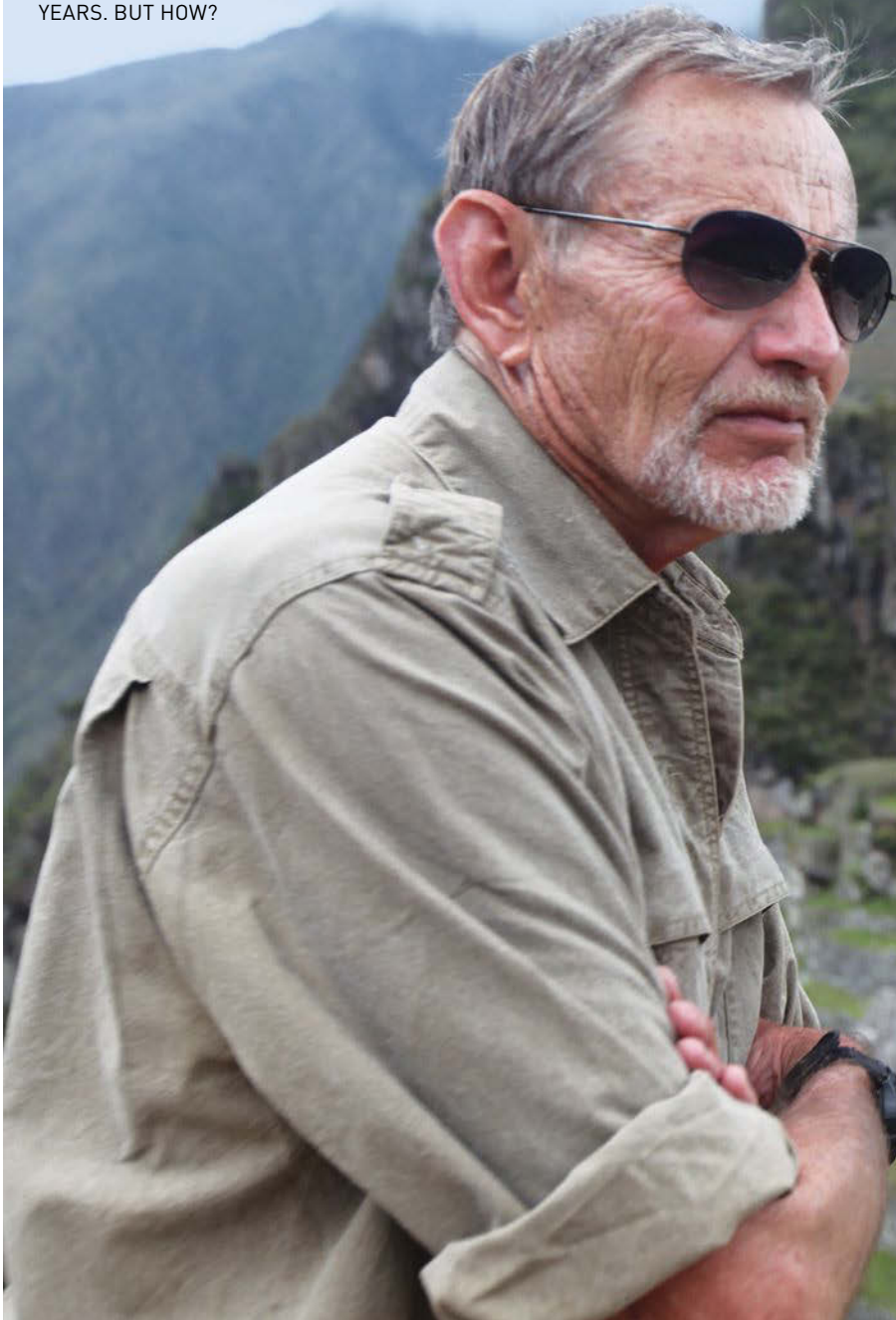
## 3 YEARS

In early 2014, anti-nuclear activists streamed into Tokyo to mark the third anniversary of the Fukushima disaster. They numbered in the tens of thousands, though one protestor noted that "people have forgotten about it — they have forgotten that there is any threat" from nuclear power.





PERCHED ON SLOPES ABOUT 3,500 METRES UP IN THE ANDES AND CONSTANTLY UNDER THREAT FROM EARTHQUAKES, LANDSLIDES AND FLOODS, THE ANCIENT CITY OF MACHU PICCHU HAS SURVIVED FOR OVER 400 YEARS. BUT HOW?

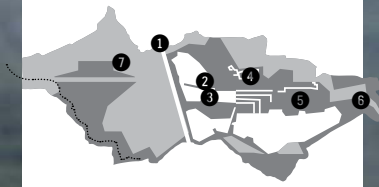


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## ANCIENT CITY MACHU PICCHU



- 1 The City Gate
- 2 The Temple of the Sun
- 3 The Royal Tomb
- 4 The Main Temple
- 5 The Main Square
- 6 The Sacred Rock
- 7 Funerary Rock

# 1,000

Number of people thought to have lived at Machu Picchu's royal complex, which has been abandoned since about 1572

# 2

The site sits atop two fault lines — hence why it was built so sturdily. Lacking mortar, the stones are fitted so closely you cannot fit a credit card between them

► He continues: “Some parts of Venice flood 250 times a year — and every decade the city sinks almost an inch (2.5 centimetres) into the lagoon. How can Venice survive?” As geologist Guido Giordano explains, sitting in a huge saltwater lagoon on the edge of the Adriatic Sea, the city is living on borrowed time.

“Venice gets flooded, not simply from the canals, but also from the ground, when the water rises,” he says. “As the flooding is becoming more and more frequent, the city is in real danger of becoming a modern-day Atlantis.”

One solution, as we discover, is the building of a chain of immense barriers around the lagoon, to seal it off from floods. “This project is very, very important for Venice, because it will resolve this problem of the high water damaging Venice,” says architect Enrico Pellegrini. “The barrier is underwater, and you raise it up only when you need it. For the Venetian people, they finally will be able to sleep at night.”

As the show's narration explains, the ingenious solution sees a series of hollow steel gates making up the barrier. “When the risk of floods is low, they lie flat on top of concrete blocks embedded in the sea floor. Water inside weighs them down. When the risk of flooding rises, pumps inject compressed air into the gates — forcing the water out and making them

more buoyant. Hinges allow the gates to swing upward, forming an immense barrier and stopping the flood waters. Once the danger passes, the gates refill with water and drop back onto the sea bed.”

In total, 78 gates form a barrier, almost two kilometres long, across the three inlets to the lagoon. Immense in scale, each concrete block for the barrier base is over 60 metres long and takes up to 12 months to build. Fittingly, the US\$7.5 billion project is code named MOSE, after the biblical Moses, who parted the Red Sea.

**CHICAGO'S HIGH TEMPERATURE CAN RESULT IN WHAT'S KNOWN AS 'URBAN HEAT ISLAND EFFECT'. THIS CAN BE COUNTERED BY MORE GREEN SPACES**

When complete in 2016, its planners hope that MOSE should help protect Venice for decades. “This is a huge project that will give a better life to Venetian people — and make me proud,” says the Lido Inlet site manager, Giulio De Polli. ►





## ► THE HEAT IS ON

For America's third largest city, the sinking feeling is one that comes when the city's temperatures soar to unbearable heights. Summer temperatures in Chicago can soar to over 100 degrees Fahrenheit (38 degrees Centigrade), while the storms that follow the heatwaves often threaten flash flooding.

On the shores of Lake Michigan, Chicago is a key US business and transport hub, transiting more planes and trains each year than any other US city. Yet the heat threatens to bring the city undone, with 2010 and 2012 experiencing among the hottest summers on record.

## GREAT PUBLIC TRANSPORT SYSTEMS, EXPANDABLE AND FLEXIBLE, ALWAYS HELP TO FUTURE-PROOF A CITY

According to the episode, a major reason for these heat waves can be traced back as far as 26,000 years ago, when the last of the series of huge glaciers moved across North America, flattening the terrain like a giant steamroller. The glaciers' lasting legacy was the Midwest's vast plains, which now fuel the heat waves — and there are no hills or mountains in the way to temper the blast.

"When a high pressure system rolls in, it grows out of control, swelling to form a giant dome," describes Kikot of these hot blasts that rock Chicago. "The sun heats the air trapped inside, causing temperatures in the city to soar."

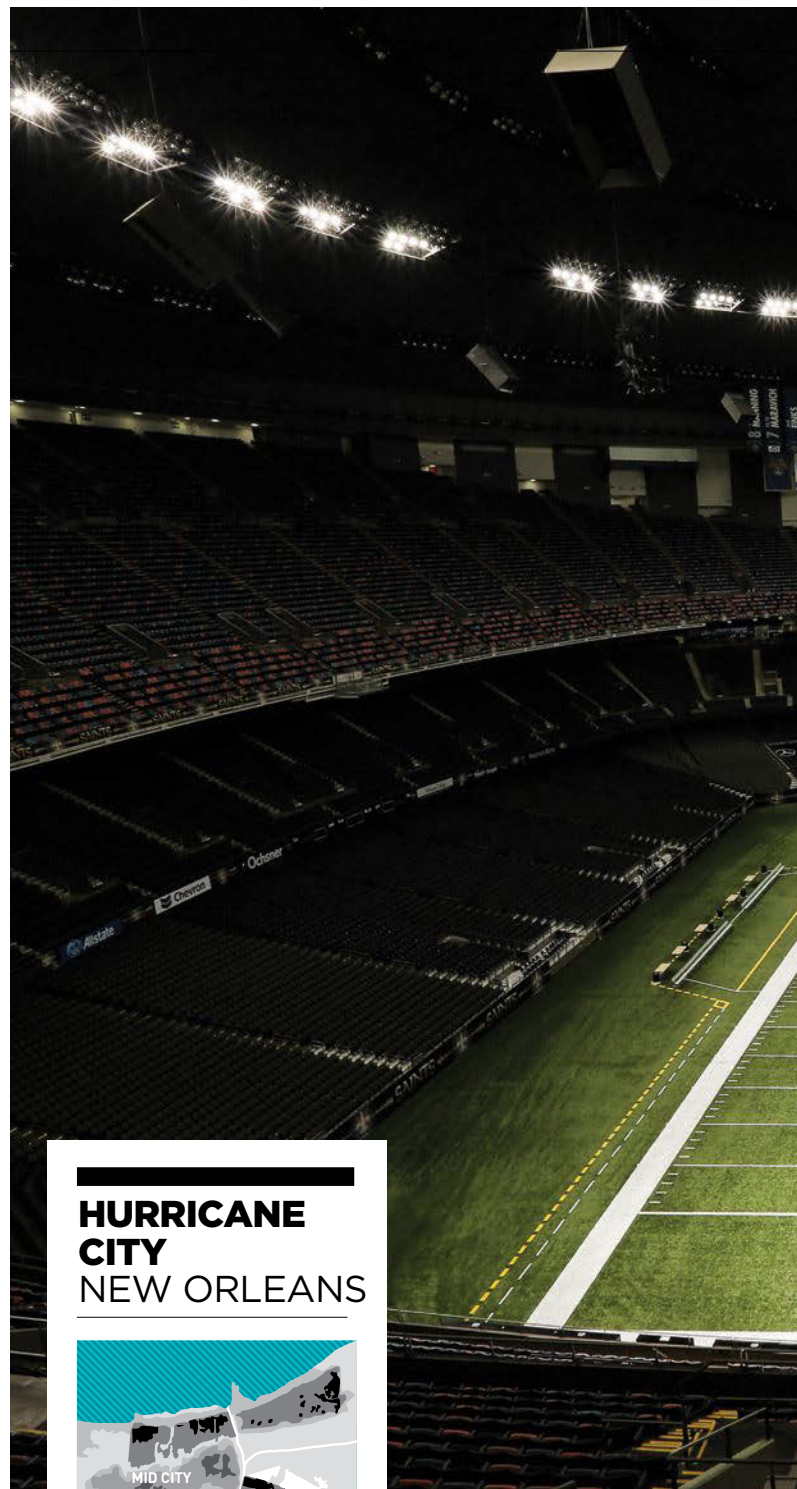
As with all problems within a major metropolis, there

is seldom a single quick fix. Instead, bundles of technical solutions tend to be employed at once. In Chicago's case, many of these revolve around cooling down the city's vast skyscrapers. The Wrigley Building, for instance, on Michigan Avenue, sees the exterior walls of this iconic landmark covered with more than 250,000 white glazed terracotta tiles, each of which serves to reflect the sun's rays.

Elsewhere, another seemingly innocuous office building conceals what is in essence a mega-refrigerator: a giant eight million litre water tank, which contains a grid of 700 kilometres of pipes — which create almost five million kilograms of ice on the pipes' outer surface every night.

The Chicago episode also highlights the problem of the city's evening temperatures remaining dangerously high, the result of concrete and asphalt absorbing heat from the sun during the day, then releasing it into the atmosphere at night. The result can be dangerously high temperatures, and what meteorologists call the "urban heat island effect". One attractive solution to this is more green spaces. Trees, shrubs and grass areas retain moisture, which on release, will naturally help cool the air.

Yet how might city planners inject large scale green spaces into dense, high-use areas? Opened in 2004, Millennium Park provides an ingenious solution. The 24.5 acre park sits on top of a major rail hub, with parking for 4,000 cars almost nine metres below. It cost over US\$490 million to build the public park with venues for performance, art, sculpture and landscape architecture. "It is the largest green roof in the world which plays a



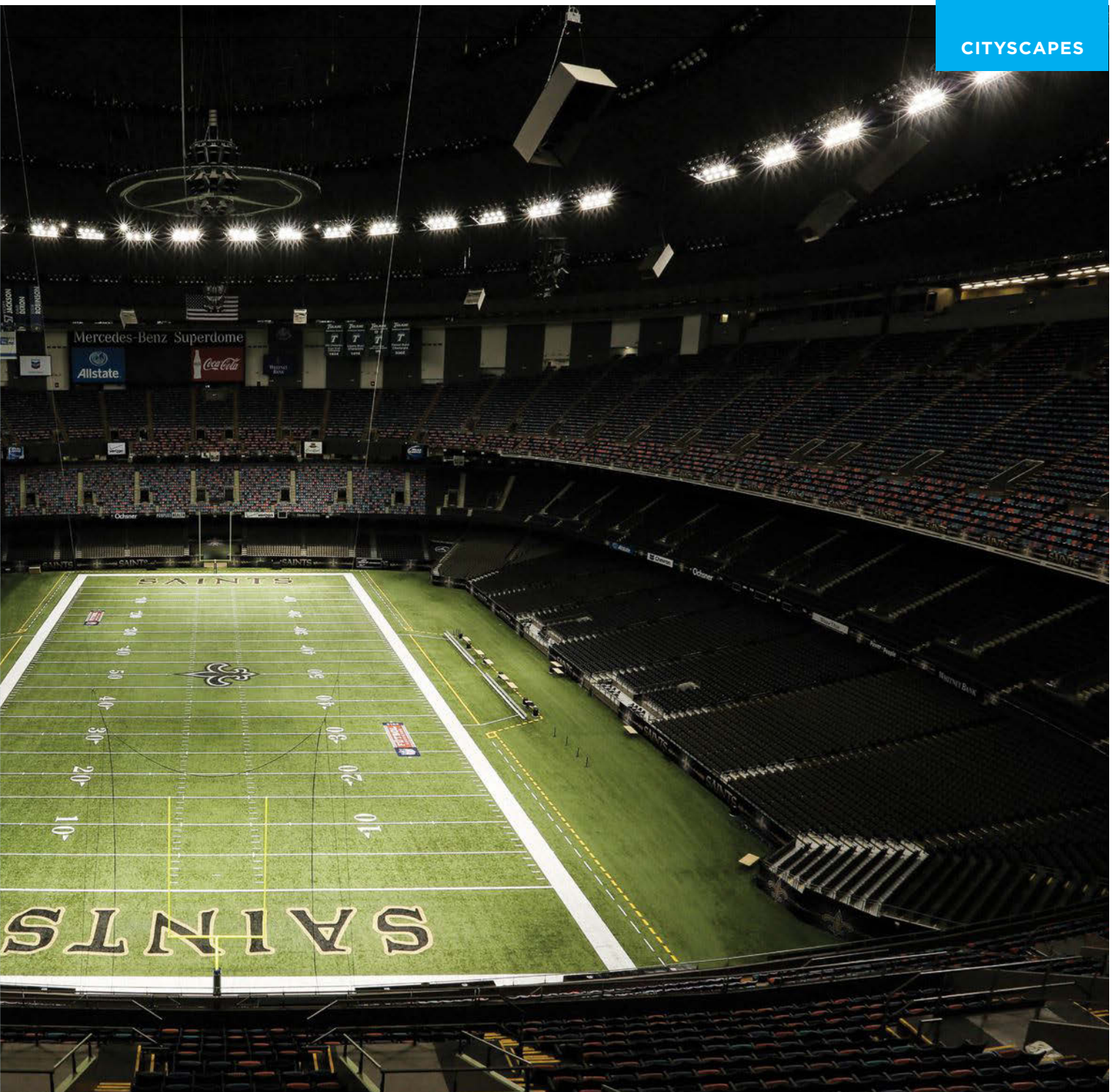
## HURRICANE CITY NEW ORLEANS



Above is a map showing the depth of flooding during Hurricane Katrina. The black portions show the highest flooding, over three metres. Dark grey portions show flooding from 2.4 to 3 metres.

BUILT ALONG THE BANKS OF THE MIGHTY MISSISSIPPI NEW ORLEANS IS A VIBRANT CITY OF CULTURE AND JAZZ — THAT IS COMPLETELY SURROUNDED BY WATER. STRIP THE CITY LOOKS BENEATH THE CITY'S GREAT SUPERDOME





PHOTOS DISCOVERY CHANNEL COMMUNICATIONS, LLC. ALL RIGHTS RESERVED (MAIN); CORBIS (HURRICANE KATRINA); GETTY IMAGES (SIDE BAR)

critical role in keeping the city cool,” says Kikot.

Nearby, the Chicago City Hall’s roof is covered by almost 1.5 million tonnes of soil and over 6,000 square metres of lush grass and plants. The project took more than a year and US\$2.5 million in investment to make happen.

“It’s the best screen roof I’ve

seen so far and it’s nice to see that it’s actually functioning and doing its job. This is a start, you know,” says thermal engineer, Ross Neirch.

The slab of concrete that previously sat atop the carpark, had acted just like a pizza oven when the temperature soared, he says. And naturally, the new green barrier is also decidedly

more attractive for the city’s residents. “This is how we begin to mitigate some of that urban heat island,” says Neirch.

### SEE AND BE SEEN

Massive hardware solutions, while impressive, are of course not the only way to transform cities. Future-proofing innovations can also target a

city’s software — making the spaces work better for their people, through measures as simple as improving street lighting to make it safer at night.

Singapore-based architect Gaurang Khemka, a specialist in urban design, runs an international firm called URBNarc. A Global Young Leader for the World Cities ►



## NEW RIVERS OF LIFE IN THE CITY CENTRE



New York's proposed underground park dubbed The Lowline also references the city's 2.3 kilometre High Line project (pictured), built on a section of a disused New York Central Railroad spur, and now successfully transformed into public open space above the street level.

Aside from the immediate benefits of offering its residents a brand new public park and fitness space, the widely acclaimed project had other positive ripple effects for the neighbourhood too. "The real estate values of buildings around the High Line went up, which brought about a whole revitalisation around it," says Khemka. "It acted almost like a river of life in a way, by making it a public open space."

In order to make scarce land resources stretch further, city planners need to be creative, both in terms of non-traditional usage, as well as co-location, inspired by mixing up the population in new, yet potentially harmonious ways.

"As populations age, especially in developed countries, the old are being left in these very dry, banal depressing estates," he notes. Managed well, he says one solution would be to bring the old and the young closer together within the city. "You could co-locate places like that beside a kindergarten or school. If it was managed carefully, you could, in turn, help create a kind of system where older folks can help play a part in educating and looking out for the children."

Likewise, co-location can also see the successful sharing of resources, to improve the lives of those in the inner city, and encourage more people to consider working and residing in the central business district. "For instance, schools and universities only get used for a certain number of hours, and they have a lot of facilities which could be used by other city residents. Likewise, public office spaces only get used during the day," he says. "So it's about thinking, how can we create certain public spaces within that, for use by residents?"

"That's not so much about engineering, it's more about changing the traditional use patterns, and finding uses that could compliment each other, not only from a commercial, but from a social viewpoint as well. Because future proofing the fabric of a city also involves social cohesion."

A PHOTO-CAPTURE FROM  
THE 2005 STORM SURGE,  
HURRICANE KATRINA



► Summit, he is a keen observer of urban planning trends.

"There's no one formula to say, let's future-proof our cities. But the key aspects allowing for future-proofing will invariably lie in making them more sustainable," he says. One key aspect of this involves "creating opportunities for people to see and be seen in open public spaces," he notes. Spaces for example, like London's

Trafalgar Square, or New York's Central Park. "Today, most successful cities have these great public spaces."

Attractive green spaces in a city's centre are not only cooling and aesthetically pleasing — they also attest to the fact that planners have tackled one of our ongoing post-war urban issues, the battle with the private car.

"Great public transport systems will always help





can't take garbage trucks in there," he describes. "Instead of putting in a high-cost mass rapid transport system, like a subway or metro, they put in dedicated bus lanes, with nicely designed bus stops. Every person from the favelas who brought a bag of garbage to the bus stop got a free ticket or ride. I thought it was the cleverest way of solving two problems at once. These kind of creative solutions need to be encouraged," he says.

## ARCHITECT GAURANG KHEMKA SAYS THAT THE METRO HAS TRANSFORMED DELHI AND HAS TAKEN THE PRESSURE OFF THE TRAFFIC

Another aspect of software improvement involves utilising "leftover" spaces within the engineered fabric of a city. "In New York for instance, some planners looked at repurposing a huge empty subway area, which they are now suggesting be converted into a park, a public space underground," he says.

The proposed location is the one-acre former Williamsburg Bridge Trolley Terminal, just below Delancey Street on the Lower East Side of Manhattan, which has been unused since 1948. Co-founders James Ramsey and Dan Barasch are marketing it as the world's first underground park, called The Lowline. Khemka thinks the project could work. "By using solar reflectors to get light in from above, it would be a great space in winter as well, as it's a protected open space." ►

future-proof a city," says Khemka. "You need transport systems that can be both expandable and flexible." Born in New Delhi in India, he says his home city is a perfect example of tackling what appeared to be an endemic traffic problem. "Delhi would be in the same situation now as Jakarta in Indonesia; except the planners bit the bullet and put in the metro, at a

big cost. It was an extensive system, and it's now rated one of the best in Asia. It was impressively executed, and completed on time," he notes.

"It's truly transformed Delhi. The traffic is still bad, but the metro in combination with a fair amount of road infrastructure, has taken the pressure off. It works now." He notes that his father regularly uses the city's

park-and-ride services, to travel across to city to see his brother. "If they hadn't done this, Delhi would be gridlocked today."

Even a lack of budget need not prevent planners from finding creative solutions. Khemka cites the example of Curitiba in Brazil. "The mayor there had a fantastic solution. He said, 'We have a problem of cleaning the slums, the favelas, because we



## ► LEADERS WITH VISION

One of the other common factors that enable even the busiest cities to successfully transform themselves has been enabling the position of city mayor to become a driver for change. “A good mayor for a city can effect a tremendous change,” says Khemka. “London and New York were good examples of that, each working closely with the chief city planner in doing so.

“And interestingly, some of the most successful cities in the developing world, where serious transformations have occurred, have been mayors who were urban planners or architects.” Indeed, it’s not just within developed countries where a visionary mayor can help to turn a city around. He cites the examples of Bogota in Colombia, and Bandung in Indonesia, as other examples of successful works in progress.

## NEW YORK’S PLANNERS LOOKED AT REPURPOSING A HUGE EMPTY SUBWAY AREA, WHICH THEY FEEL SHOULD BE CONVERTED INTO A PUBLIC SPACE BELOW GROUND, USING SOLAR REFLECTORS

“I think Bandung is going to be the next example,” he says. “Sometimes it’s about funny ideas that work: in peace time for instance, a lot of cities have a large army, doing basically nothing. Why not deploy them to do certain things in the city — like organise big activities?

“The mayor of Bandung actually did that. He was an urban planner, who deployed the army corps in Bandung to help clean up the waterways; and then the people got involved.” With funding in from the Asian Development Bank, in 2011, Bandung began revitalising West Java’s Citarum river, dubbed one of the world’s most polluted waterways due in particular to run-off from the textile industry. Though still far from pristine, reports say the river has seen visible improvements, due to the large scale efforts of local people.

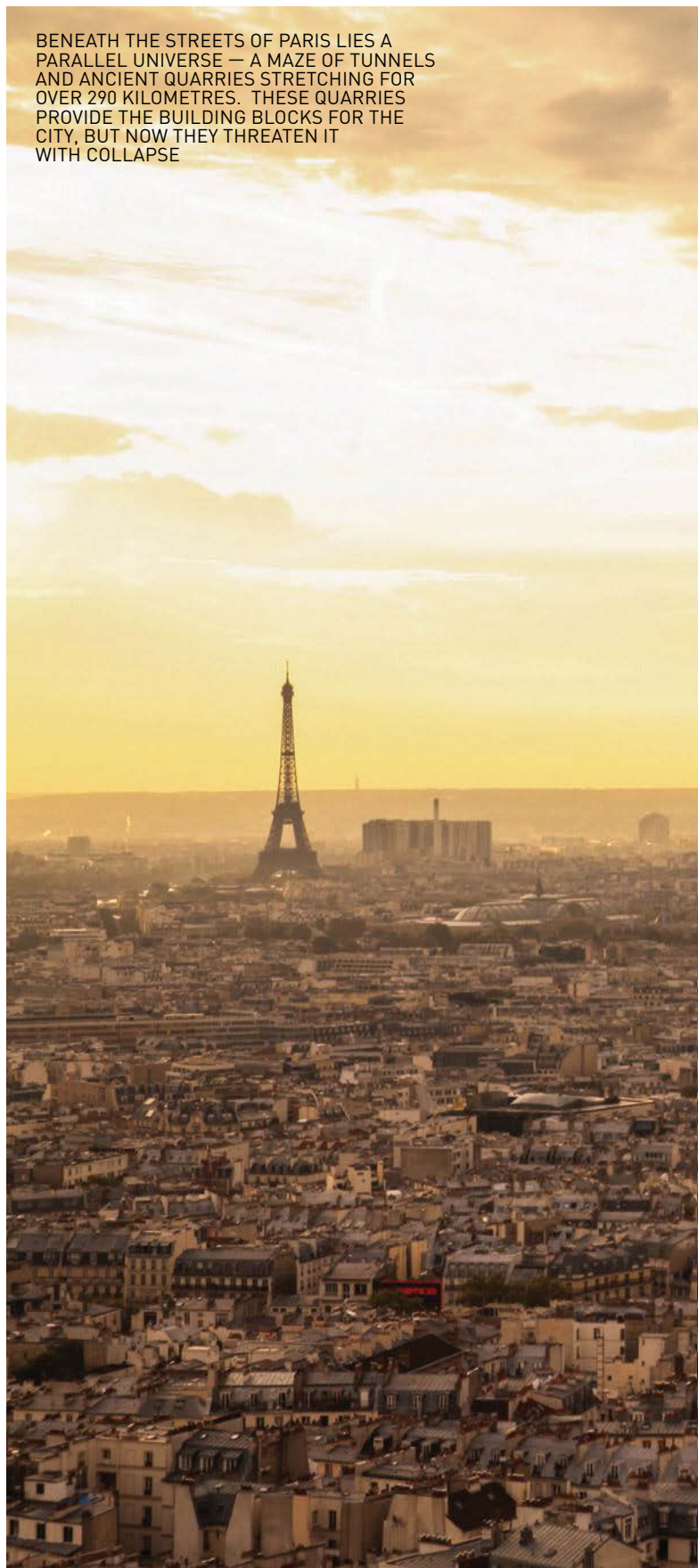
In a globalised environment, the need for cities to be more people-centric is now as much an economic as it is a social imperative. While economic growth may at first be driven by heavy industry, sustaining that growth will usually involve the transition to a services-based economy. Even for economic powerhouses like China, sustaining recent boom times could become a challenge, unless the world’s best and brightest can be persuaded to live in its biggest cities.

As such in any city, clogged highways and a lack of breathable air, are ultimately bad for business. “In the past, cities were not planned so much to attract the best and the brightest,” says Khemka. “But today, cities are the generators of wealth, and will have to adapt to a whole range of peoples and professions — and keep attracting them.

“That’s the key to future-proofing now — to attract people, and to give them a place where they enjoy living.” Hopefully in the act of doing this, our stories of the naked city will begin to revolve less around merely surviving the future, and more around actively embracing it. ●

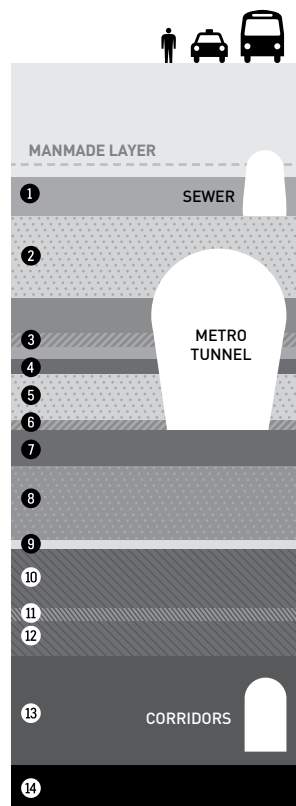
BENEATH THE STREETS OF PARIS LIES A PARALLEL UNIVERSE — A MAZE OF TUNNELS AND ANCIENT QUARRIES STRETCHING FOR OVER 290 KILOMETRES. THESE QUARRIES PROVIDE THE BUILDING BLOCKS FOR THE CITY, BUT NOW THEY THREATEN IT WITH COLLAPSE

PHOTO: DISCOVERY CHANNEL COMMUNICATIONS, LLC. ALL RIGHTS RESERVED. ICONS: DANIEL BEHREND (PERSON FROM THE NOUN PROJECT)





## CAVERN CITY PARIS



- 1 White marl
- 2 White marl and loose stones
- 3 Yellow sand
- 4 Loose stones
- 5 White marl and loose stones
- 6 Yellow sand
- 7 Loose stones
- 8 Grey marl and loose stones
- 9 Sand
- 10 Rock
- 11 Small rocks
- 12 Rocks
- 13 Catacomb corridor
- 14 Backfill



A small inset photo showing Tamron Hall. She is wearing a headband and a dark jacket, looking back over her shoulder.

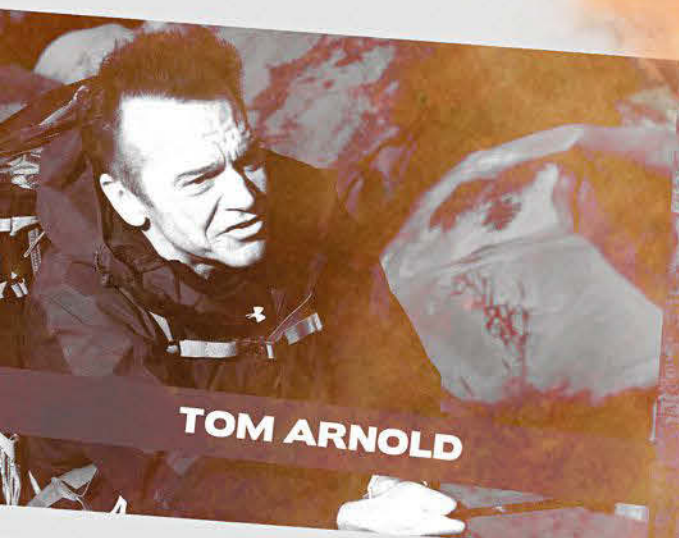
**TAMRON HALL**

A small inset photo showing Ben Stiller. He is wearing a dark beanie and a jacket, looking directly at the camera.

**BEN STILLER**

**WATCH BEAR GRYLLS  
TAKE SIX CELEBRITIES  
FOR A 48-HOUR JOURNEY  
OF A LIFETIME.**





**TOM ARNOLD**



**DEION SANDERS**



**CHANNING TATUM**



**ZAC EFRON**

 **Discovery**  
CHANNEL™

# **RUNNING WILD**

**WITH BEAR GRYLLS**

**STARTS 13<sup>TH</sup> FEB | FRI TO SUN 9 PM**

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# OYSTERS, WINE AND LOVE STORIES

IT'S VALENTINE'S NIGHT AND THE TABLE IS SET WITH BABOON URINE, SNAKE BLOOD AND BULL TESTICLES BOILED IN MILK. DISGUSTED? DON'T BE. LIBIDO BOOSTING FOODS COULD BE YOUR BEST FRIENDS YET.

**ADII DANDE** DECODES THE SCIENCE BEHIND THE WORLD OF FOOD APHRODISIACS



OK, this is hunger of a different kind. But which can be satiated by the right kind of food as well! If getting intimate with food guarantees you unbelievable highs, just how far would you go?





OYSTERS CAN EASILY BE NAMED THE MOST POPULAR APHRODISIACS EVER. NOTORIOUS LOVER CASANOVA WAS SAID TO HAVE 50 RAW OYSTERS FOR BREAKFAST EVERYDAY!



**A**

pparently, people can go to any and every extent to enhance their act of love. Did the baboon and snake bit give you a jolt? Let's take a subtler route. How does milk with rock sugar and saffron, cinnamon-dusted cocoa milk or oysters sound? Definitely better options!

#### **A LONG-KNOWN SECRET**

The foods in question here, aphrodisiacs, are substances or elements that enhance sexual desire. It must be

remembered however, that aphrodisiacs are entirely different from medications for sexual or fertility dysfunctions. The name comes from (no prizes for guessing) Aphrodite, the Greek goddess of love and beauty. The famous story goes that she was born of sea foam, and is often even depicted emerging from a seashell, which can be an explanation to why seafood is believed to work wonders for one's sex life. In fact, it has been reported that seafood is so potent, especially oysters, that the 18th century notorious lover, Casanova, had 50 raw oysters for breakfast everyday!

But what else is it about certain foods that make them seem so sensual? Why is food linked with sex so often? The most logical reason is that cooking and eating, ►



► just like sex, require the complete involvement of all five senses. Psychologists and relationship counselors recommend couples cook and eat together for a stronger bond and better intimacy. However, there are disagreements in the medical fraternity too when it comes to the efficacy of aphrodisiacs. Dr Prakash Kothari, the founder professor of the department of sexual medicine at the KEM Hospital and Seth GS Medical College, Mumbai, says that the highly professed aphrodisiac effects of certain foods are “all in the mind”. Dr Kothari, who has authored books like *Orgasm: New Dimensions and Sex and You*, says, “Most aphrodisiac foods resemble male or female sexual organs in some way, which makes them seem sensual more than anything else. Carrots, bananas, clams and oysters, ginseng, are a few examples.”

### NOT MIND PLAY AFTER ALL!

In 2005, a study conducted at the Barry University, Miami, USA, chemistry department showed that a group of shellfish, of which oysters are a part, had high amounts of rare amino acids that were responsible for triggering sex hormones. These rare amino acids, D-aspartic acid (D-Asp) and N-methyl-D-aspartate (NMDA) cannot be found in over-the-counter nutritional supplements. The research team injected these amino acids into rats and noted that a series of reactions were triggered which increased the production of testosterone in males and progesterone in females. High levels of these hormones mean that one feels more active sexually. Clearly, Casanova had long-discovered this secret, and his well-detailed rampant hedonistic endeavours are

YOGURT SOUFFLE  
WITH MINT,  
STRAWBERRY AND  
BLACKBERRY



NO ROMANTIC MEAL IS CONSIDERED COMPLETE WITHOUT CHOCOLATES, STRAWBERRIES AND WINE. IT IS NO SURPRISE, GIVEN THE SENSUALITY AND ROMANTIC ELEMENT ATTACHED TO THESE FOODS. A LIGHT DUSTING OF SPICES, LIKE CINNAMON (FAR RIGHT) CAN ADD AN APHRODISIACAL TOUCH TO DESSERTS

PHOTOS DREAMSTIME





proof enough!

While many doctors are still not completely convinced about the efficacy of aphrodisiacs, Dr Sandeep Madaan, MD Ayurveda, of AasthaAyurveda, Delhi, says, "Ayurveda has illustrated details about aphrodisiacs in an entire chapter titled *Vajikaran Chikitsa*. According to which, aphrodisiacs provide nutrition to the body, especially to *shukra* (reproductive fluids) and maintain healthy microcirculation. However, Ayurveda also talks about psychology and environment contributing to a person's sexual behaviour."

While some say that most of this is simply mind play, according to clinical psychologist Seema Hingorrany, it isn't completely psychological. "For your brain to communicate with your body, it needs chemicals called neurotransmitters to conduct electrical impulses or brain waves. You may have heard of certain neurotransmitters like dopamine, endorphins and serotonin. Your body has to manufacture these chemicals, and it uses the enzymes, amino acids, minerals, proteins and carbohydrates in the foods that you eat to do that. Certain foods, rich in these, therefore aid in enhancing the sexual desires. And no, it isn't psychological," she says.

#### FOOD TO IGNITE PASSION?

Can food be the only reason behind all the love and romance that triggers passionate love making? Psychiatrist and therapist at the Fortis Hospital, Mumbai, Dr Parul Tank, says, "There is some evidence that some foods do increase serotonin, which helps improve the mood and thereby sexual desires. However, the



## APHRODISIACS GET THE NAME FROM THE GODDESS OF LOVE, APHRODITE, WHO WAS SAID TO BE BORN OF THE SEA - THE REASON MOST SEAFOOD IS CONSIDERED SENSUAL

evidence is scant and not approved by the FDA. There are all types of foods which have been labelled to be improving sexual desires - dry fruits, chocolates, oysters, some roots, spices, etc. But the level of chemicals in them is very less for any immediate effect." She adds, "I would say it is not the food but the presentation, the ambience and the appreciation which brings up the serotonin and dopamine neurotransmitters that lead to the feeling of an emotional well being." Dr Tank suggests that eating a healthy diet with oily and spicy meals also leads to a sense of momentary "feel ►







MICHELIN-STARRED CHEF VIKAS KHANNA SHARES RECIPES FROM HIS BOOK DEDICATED TO 'LOVE FOODS', *FOOD LESSONS IN LOVE - KHANNA SUTRA*

## ESCARGOTS WITH MINT-BUTTER FILLING

### Ingredients

- 8 ounces unsalted butter, softened
- 3 cloves garlic, minced
- ¼ cup minced mint leaves
- 1 small shallot, minced
- 1 teaspoon brandy
- Freshly ground black pepper
- 24 snail shells, cleaned
- 24 canned escargots (giant snails)
- Rock salt
- 8 lime wedges
- Salt to taste

### Directions

- 1 Beat together the butter, garlic, mint, shallots, brandy, salt and pepper in a medium-sized mixing bowl. Cover the bowl and refrigerate for at least 4 hours
- 2 Preheat the oven to 400F
- 3 Divide the butter mixture into half. Using a butter knife, fill snail shells with half the mixture. Push a snail into each shell, and then use the remaining mixture to fill shells to the rim.
- 4 Cover the bottom of a baking pan with rock salt and arrange the escargots buttered-side up. Bake, for about 8 to 10 minutes until butter sizzles
- 5 Serve hot with lime wedges



A MEAL AS SIMPLE AND EASY-TO-COOK AS PANCAKES CAN BE TURNED INTO A ROMANTIC FARE BY SERVING WITH FRESH FRUIT AND HONEY

► good”, and this along with exercise and a stress-free lifestyle can improve one’s desires as well.

For someone like the Chef Vikas Khanna, who is completely in love with the whole concept of food and using it as a medium to spread love, the aphrodisiacal element lies all in the eyes and the appeal. The Michelin-starred chef has authored a book dedicated to sensual foods. *Food Lessons in Love - Khanna Sutra* is a compilation of exotic and home-based recipes

that promise to titillate the senses. Khanna says that the most commonly known aphrodisiacs have a facet of exoticism attached to them, and this, when complemented with beautiful presentation can work wonders and add to romance and passion for a couple. He also adds, “Certain foods are believed to set a mood; some by their fragrance, some by their oils or their taste. They help to create a special menu for an occasion, without a doubt. But by themselves they can





mean nothing unless they reach that special person.” Not so commonly available foods like truffles, oysters, some rare mushrooms, saffron and honey; and some everyday foods like avocado, peaches, almonds, garlic and ginger, are very popular ingredients in sensual or romantic meals, informs Khanna. He also shares that he has successfully used these ingredients time and again for many Valentine’s Day meals, and the recipes have also been requested by several guests over the years.

Delhi-based French bistro, Rara Avis, is popular among couples for its quixotic setting, appealing ambience and exotic French fare. “We have rare varieties, often associated with sensual pleasures, that our guests love. Foie Gras, scallops, raw sea food platter and escargots (snails) are especially asked for by couples, apart from oysters, chocolates, strawberries and truffles, while enjoying romantic dinners,” shares Rajiv Aneja of Rara Avis. He also informs that Tenderloin ►

## SAFFRON, RADISH AND TOMATO SOUP

### Ingredients

- 1 bunch radishes (about 1 pound)
- 1 tablespoon vegetable oil
- ½ cup chopped carrot
- 2 cloves garlic, minced
- 2 (28 ounce) cans crushed tomatoes
- 2 tablespoons all-purpose flour
- 4 cups vegetable broth
- ½ teaspoon dried thyme
- 1 teaspoon saffron strands, plus a pinch for garnish
- 1 cup water, or as needed
- ½ cup heavy cream
- Salt to taste

### Directions

- 1 Clean and trim the radishes, discarding the greens. Cut them into half, reserving one for the garnish
- 2 In a Dutch oven, heat the oil over medium heat. Add the radishes, carrots, garlic and season with salt. Cook, stirring continuously, for about 3 minutes until the radishes are tender. Stir in the tomatoes and flour, and cook for another 2 minutes
- 3 Add the broth, thyme and 1 teaspoon saffron and bring to a boil. Cover and simmer for about 10 minutes until the mixture is well-combined
- 4 Transfer the mixture to a blender or food processor, and puree the mixture in batches until smooth. Add enough water to achieve the desired consistency. Return the soup to the saucepan and stir in the heavy cream and cook over moderate heat until it is hot
- 5 Thinly slice the reserved radish and garnish the soup, topped with a slice of radish and a pinch of saffron
- 5 Serve hot with lime wedges





► Cordon Rouge, Frog legs in butter-garlic cream sauce and Escargots in Amour are some dishes that have proved to be favourites on Valentine's Days. "It should be remembered though," he adds, "Any food which is rare cannot be erotic. Also, the belief that eating foods which bear a resemblance to sexual organs lead to a greater libido, does not hold

of sex hormones and neurotransmitters that modulate sexual urges. Naturally, foods rich in these nutrients can work as aphrodisiacs," she says. "However," she adds, "In some cases, results may simply be a placebo effect as psychology plays an important role when the act of lovemaking is concerned." It can then be believed that some foods can, over a period of time, enhance the pleasure and excitement that intimacy brings.

## CERTAIN FOODS ARE BELIEVED TO SET A MOOD; SOME BY THEIR FRAGRANCE, SOME BY THEIR OILS AND SOME BY TASTES

### THE LIBIDO KILLERS

The incessant desire to have more and better sexual pleasure can prove to be damaging. Many have fallen prey to gimmicks that assure instant results. Experts have cautioned time and again about the dangers of consuming over-the-counter sex "medications" and herbs that are marketed and sold. Dr Kothari says that these so-called "instant" remedies can have different effects on the body that can affect the sexual performance; like, alter the state of mind (as in case of addictive drugs), increase blood flow to the private parts (like Spanish fly) or just have a placebo effect (with foods that resemble the male and female genitals). "Over-the-counter *jadibooti* or herbs, as can be imagined, are stale. They have been procured and packaged by people who are no experts on the subject. Such medicines or herbs can do more harm than good," he states. In fact, some of these "performance boosters" can also cause permanent damage to the reproductive or urinary tract, completely killing the desire to get physically intimate.

Stress can be another desire buster that obviously cannot be cured by any aphrodisiac. And while sex ►



A ROMANTIC CANDLELIGHT SETTING AT THE BISTRO, RARA AVIS IN DELHI

any truth."

But what does food add to the whole "love and bonding" scene? Delhi-based clinical nutritionist Lovneet Batra says that some foods do contain the nutrients that are required to trigger the production of certain sex hormones, and some even aid in giving a surge of passion. "Certain nutrients such as essential fatty acids, selenium, magnesium, zinc (required for the production of testosterone), vitamins C, E and B complex are important for the production



STRAWBERRY  
SOUFFLE SERVED  
WITH BLACKBERRY  
AND MINT



ESCARGOTS OR  
SNAILS (LEFT)  
AND SAFFRON  
ARE SAID TO  
BE POTENT  
APHRODISIACS

## NUTRI-CHECK

DELHI-BASED CLINICAL NUTRITIONIST LOVNEET BATRA EXPLAINS WHY CERTAIN FOODS ALLEGEDLY HELP KEEP THE PASSION ALIVE:

### 1 / CHOCOLATES

Chocolates, especially the dark variety, have methylxanthines. These chemicals are responsible for the immediate feeling of euphoria because of the release of dopamine, which is attributed to "feeling good"



### 2 / STRAWBERRIES

This fruit is rich in heart-friendly antioxidants and vitamin C, which together work towards a higher sperm count. Also, these nutrients promote healthy circulation – a must for sexual functioning in both men and women



### 3 / BANANAS

They go beyond the phallic shape. The high levels of potassium and B vitamins are vital for the production of sex hormones



### 4 / ALMONDS

They are high in essential fatty acids, zinc, selenium and vitamin E – the nutrients that are vital for sexual health



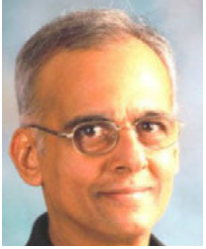
### 5 / SESAME SEEDS

The high zinc content in sesame seeds makes them important in testosterone production





## EXPERT-SPEAK



DR SUDHAKAR KRISHNAMURTI, ANDROLOGIST, MICROSURGEON, SEXUAL MEDICINE CONSULTANT, IS INDIA'S FIRST DOCTOR TO EXCLUSIVELY PRACTICE ANDROLOGY. HE IS THE DIRECTOR OF THE 'ANDROMEDA ANDROLOGY CENTRE', HYDERABAD,

INDIA'S FIRST EXCLUSIVE ANDROLOGY CENTRE. HE IS ALSO THE MEMBER OF THE 'WHO COMMITTEE OF SEXUAL HEALTH AND SEXUAL DISORDERS'. DR KRISHNAMURTI HAS AUTHORED THE BESTSELLER - *SEX IS NOT A FOUR-LETTER WORD*. HE THROWS SOME LIGHT ON THE COMPLEX SUBJECT OF APHRODISIACS AND LIBIDO-ENHANCERS

### How did aphrodisiacs come into existence?

Sex is man's second strongest instinct after survival. So, it is not surprising that human beings have had a healthy preoccupation with sex across continents over time. Interest from every system of medicine across every continent was inevitable, and every part of the world had its own "miracle cures" for any debility or dysfunction. Few of these remedies however, were born of scientific research in the real sense, and many succeeded mainly as placebos.

That has changed now, and specific evidence-based drugs are available for nearly every sexual condition and dysfunction in both women and men nowadays. There are also some very advanced and new surgical techniques in the new fields of sexual medicine, andrology, and female sexual health. Of course, the Stone Age diehards will still continue to peddle their ancient remedies, but I'd be really circumspect about those.

### Can the population of a region be related to the local diet or any particular ingredients that are consumed?

There is no evidence-based study to substantiate this conjecture. Many highly-sexed and healthy societies that can afford the best "aphrodisiacs" choose deliberately to limit their family and national populations. The highest populations are usually in the poorer countries.

### Are there aphrodisiacs that actually work?

Aphrodisiacs are drugs that purportedly increase sexual desire (libido) and/or performance in humans, especially men. They act in different ways: substances like Yohimbine stimulate nerve centres in the spine, which, in turn supposedly results in an improved erection; Spanish fly irritates the GU (genitourinary) tract, resulting in ►►

TO SEE HOW IT CAN AGAIN SURVIVE A STORM SURGE LIKE 2005'S HURRICANE KATRINA



GINSENG, ASHWAGANDHA OR INDIAN GINSENG (RIGHT) AND RHINO HORN (FAR RIGHT) ARE OLD-FASHIONED APHRODISIACS AND WIDELY POPULAR BECAUSE OF THEIR RESEMBLANCE TO THE MALE GENITALIA



## APHRODISIACS AS STRESS- BUSTERS?

Diminished sexual desire due to stress or depression needs a proper, well-thought intervention. No food can instantly remedy this! It has to be in combination with other psychological treatments. However, we do advise patients to have certain foods as a part of the treatment protocol for better results.

- Seema Hingorrany,  
Psychologist

## LOVE FOODS

►► increased blood flow to the genitalia. Libido is also linked to levels of sex hormones in a person, notably testosterone (in both sexes). Hence, testosterone can increase libido in those men and women who are deficient in it. Interestingly, the humble and very safe paracetamol (known to most of us as Crocin, the antipyretic or fever reducing drug), has also been shown to have aphrodisiacal properties. Sadly though, this is corroborated only in rats yet. Dubious "traditional" con aphrodisiacal products like rhino horn, deer antler, cloves, sandalwood, Alder bark, gypsy weed, rose petals, patchouli, catuaba, 'tiger penis' and such, have been widely used all through human civilisation, making them perhaps the most widely sold products in history. Many of these are often used in conjunction with one another. However, much of the credit that goes to these aphrodisiacs is a consequence of the power of suggestion, and the faith the buyer has in it is often directly proportional to the exorbitant sums of money paid to procure it rather than its pharmacological merits.

### Are there any changes that take place in the body after the consumption of libido-enhancing substances?

Commonly marketed and over-the-counter medications, herbs, etc, all of them, cause some harm or the other to the body. For instance, Yohimbine can increase blood pressure, heart rate, and cause dizziness. Spanish Fly can irritate the genitourinary tract and cause severe ulceration and fibrosis; taken orally, it can even be fatal. The list of side effects is long, depending on whether they cause cerebral arousal/alteration, increased blood flow and congestion to the genitalia, and many other assorted unwanted and undesirable side effects, depending on the chemical/s contained.

None of these drugs is FDA (or other relevant suitable bodies) approved. They are sold without any warnings or responsibility for their "pharmacological" actions, and are mostly routed through quack markets rather than through drug certified channels. In higher than recommended doses, the side effects can be serious, and can include death.

### So, what according to you works best?

Contrary to widely-held popular beliefs, the best aphrodisiacs for men and women are not abstruse food, herbs, pills or injections, but a healthy, sexually inclined, and compatible partner. Sexual dysfunctions, if any, must be addressed and treated by andrologists and women's sexual health experts, as there can be many medical causes of poor sexual health in both women and men.





# APHRODISIACS YOU WOULDN'T WANT TO TRY...

## BULL TESTICLES SOUP

PHILIPPINES

ALSO CALLED SOUP NUMBER 5, THIS DISH IS A FAVOURITE WITH FILIPINO MALES



## CATERPILLAR FUNGUS

CHINA, NEPAL

KNOWN AS SUMMER GRASS OR WINTER WORM, THIS STRANGE FOOD IS CALLED 'VIAGRA OF THE HIMALAYAS'



## BALUT OR BOILED DUCK EMBRYO

PHILIPPINES, CAMBODIA, VIETNAM

THIS STREET-FOOD IS ONE OF THE CHEAPEST SOURCE OF 'STRENGTH' FOR VIETNAMESE MEN



## BABOON URINE

ZIMBABWE

APPARENTLY, CRYSTALLISED BABOON URINE IS ZIMBABWEAN WOMEN'S FAVOURITE WHEN IT COMES TO SEDUCE MEN



## SNAKE/BAT BLOOD

SEVERAL PARTS OF ASIA

THOUGH DEEMED HAZARDOUS TO HEALTH, FRESH SNAKE AND BAT BLOOD IS STILL CONSUMED BY MANY ASIAN MEN FOR 'EXTRA POWER'



► can itself be a de-stressor for some, chronic psychological stress evidently ebbs sexual urges. "Diminished sexual desire due to stress or depression needs a proper psychological intervention. Just by having certain foods, one cannot enhance sexual desires. This has to be in combination with other psychological treatments. We do advice to have certain foods as a part of the treatment protocol for better results," states Hingorrany. Although patients may not be advised a complete food-based treatment, medical professionals very often combine this with medical and psychological therapies for patients with total lack of sexual desire. This ups the possibility of positive results. "The way that food aphrodisiacs help here is that they break the cycle of events that cause the sexual problems. Low mood leads to low libido, erectile dysfunction, premature ejaculation and similar complaints, which further leads to even more stress and depression," says Dr Madaan.

## KITCHEN "LOVE FOODS"

Aphrodisiacs in no way can be considered magic potions or wonder foods that promise instant pleasure. "Those looking for some help, should in fact try easy home remedies," Dr Kothari suggests, "Like, a mixture of one cup milk, one teaspoon cow's *ghee* (clarified butter) and one teaspoon rock sugar. According to Ayurveda, this mix tranquilises the mind, sending messages to the spine, and causing the desired arousal when the mood and the ambience are right. These signals to the spinal cord increase blood flow to the private parts, eventually ensuring pleasure during physical intimacy."

GARLIC TOMATO CHUTNEY WITH MUSTARD SEEDS - ANOTHER QUICK ADDITION TO UP THE APHRODISIACAL PROPERTIES OF A ROUTINE MEAL





It is in fact a facile misconception that desire-boosting foods can be enjoyed only in fancy restaurants. The truth is much different, on the contrary. Most common sensual recipes are the simplest and can be cooked easily at home! "I always feel that home-cooked recipes have more power than restaurant food which is cooked for money," he says, suggesting that ingredients like ginger, garlic, saffron, honey, chocolates, etc are available in almost all homes, and can be included in simple recipes to device the most romantic meals! Hingorrany backs this. She adds, "Cooking and eating together increases bonding. It makes you feel loved, valued and cared for. These small activities are therapeutic for marriage and bonding."

## POPULAR APHRODISIAC, SPANISH FLY, IRRITATES THE GENITO URINARY TRACT CAUSING SEVERE ULCERATION AND FIBROSIS

Libido-enhancing or not, it needs no rocket science to understand that no food can really work if the partner is not "interested or interesting", as Dr Kothari puts it. And as it is rightly said, your biggest sex organ is the one between your ears, the attraction that stems out of love and respect that binds you with your partner is a fact sensual enough to ignite passion; the ambience, candlelight, roses and of course exotic foods, only fan the flames. ●





# THE RESISTANCE MOVEMENT

WHY DO SOME PEOPLE SURVIVE  
DEBILITATING DISEASES, WHILE OTHERS  
FALL VICTIMS TO THEM? HOW DOES THIS  
APPARENTLY RANDOM SURVIVAL DICTATE  
WHO WE ARE? AS **RACHEL SULLIVAN**  
DISCOVERS, THE ANSWER LIES IN  
UNLOCKING THE SECRETS OF OUR  
GENETIC LEGACY

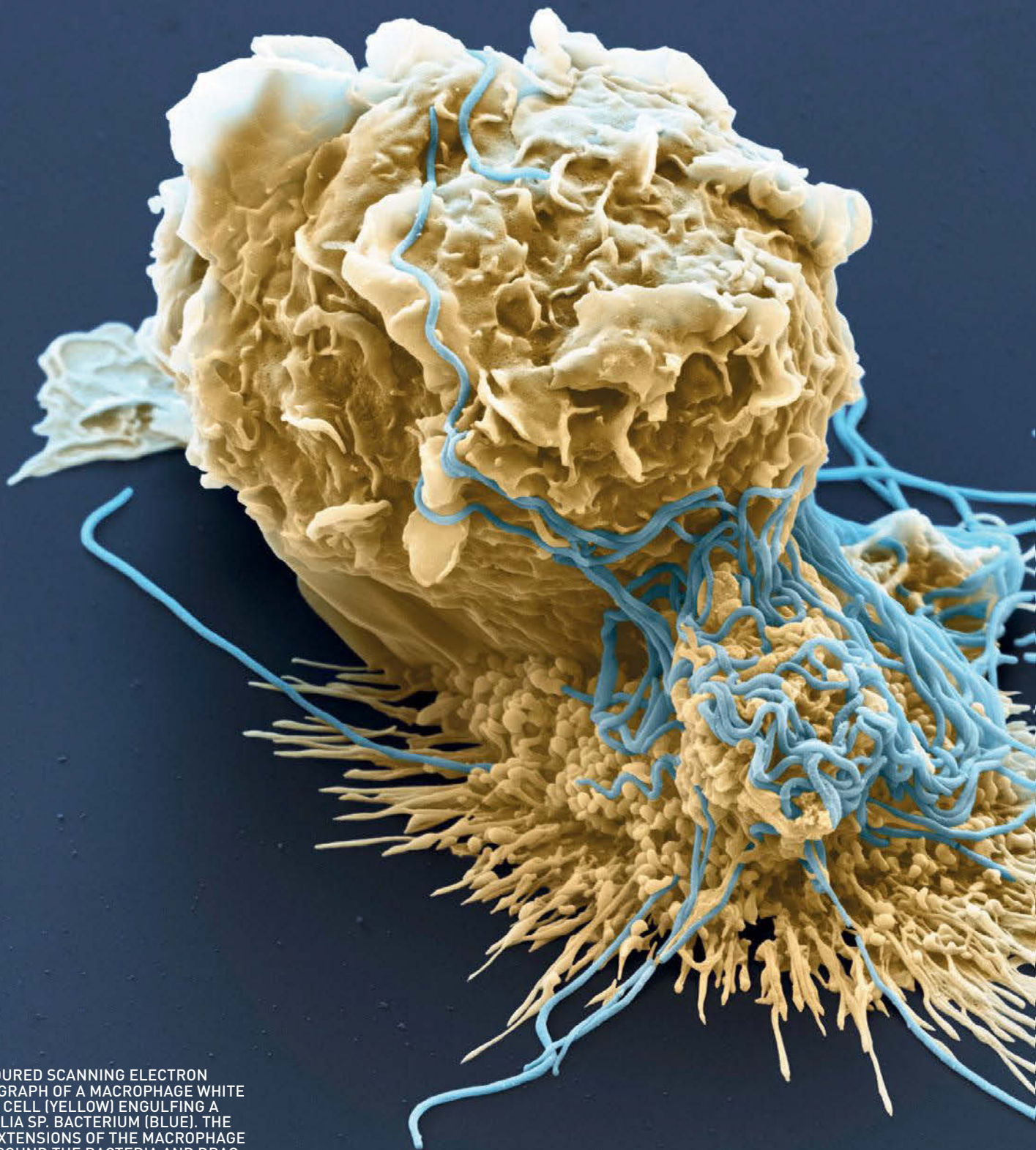




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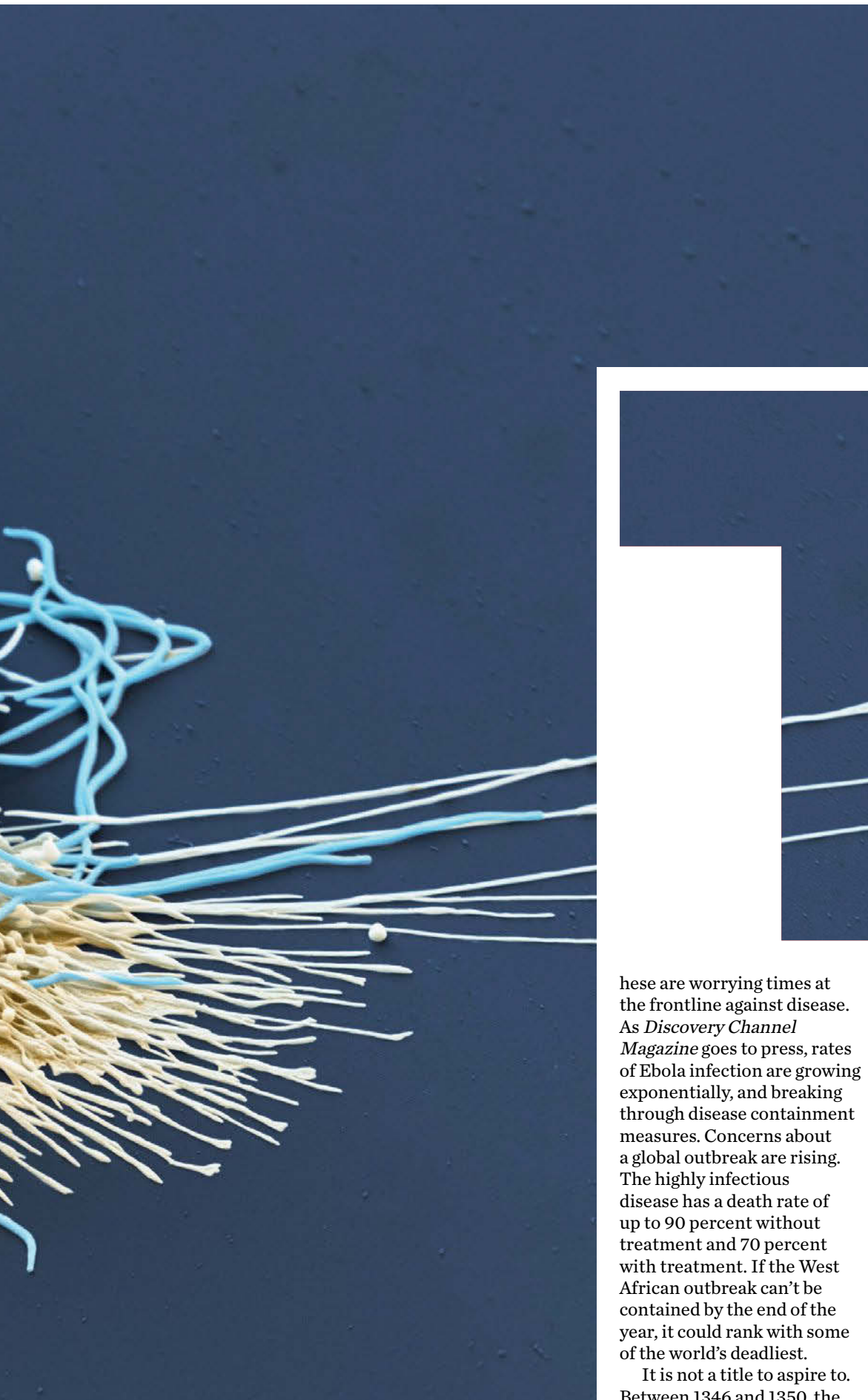
MACROPHAGE  
WITH AN EXTENDED  
PSEUDOPOD





A COLOURED SCANNING ELECTRON MICROGRAPH OF A MACROPHAGE WHITE BLOOD CELL (YELLOW) ENGULFING A BORRELIA SP. BACTERIUM (BLUE). THE FINE EXTENSIONS OF THE MACROPHAGE FLOW ROUND THE BACTERIA AND DRAG IT UP TO THE CELL. THIS PROCESS IS CALLED PHAGOCYTOSIS. MACROPHAGES ARE IMMUNE CELLS THAT PHAGOCYTOSE AND DESTROY PATHOGENS, DEAD CELLS AND CELLULAR DEBRIS. THEY ARE FORMED IN THE BONE MARROW AND CIRCULATE IN THE BLOOD





These are worrying times at the frontline against disease. As *Discovery Channel Magazine* goes to press, rates of Ebola infection are growing exponentially, and breaking through disease containment measures. Concerns about a global outbreak are rising. The highly infectious disease has a death rate of up to 90 percent without treatment and 70 percent with treatment. If the West African outbreak can't be contained by the end of the year, it could rank with some of the world's deadliest.

It is not a title to aspire to. Between 1346 and 1350, the

Black Death killed around two-thirds of infected people in Europe, the Middle East, Russia and northern Asia, fundamentally changing the course of European history in the process. Untreated cholera outbreaks, such as the pandemic that raged around the world in the 19th Century, have mortality rates of 50 to 60 percent. Even the dreaded smallpox killed only 30 percent of its victims, although it is estimated to have wiped out 90 percent of people infected, when European explorers brought the disease to the previously unexposed new world. ►



► SARS, by comparison, had a relatively low mortality rate of just under ten percent, despite dire predictions and widespread panic when it spread from Hong Kong to 37 countries in 2002 and 2003. While these figures are sobering, they also point us towards a curious and important fact. Prior to modern medical intervention, even in the worst outbreaks of the worst diseases, some people survived. Which lends some scientific weight to the adage that what doesn't kill us makes us stronger — as a species, at least.

## OUR IMMUNE SYSTEM IS DESIGNED TO ADAPT AND EVOLVE VERY RAPIDLY IN RESPONSE TO ATTACK, RESULTING IN EFFICIENT HANDLING OF MOST INFECTIONS

### DISEASES ARE US

Whether we acknowledge it or not, disease has been one of the major forces shaping what we are today. It is known that humans evolved originally in Africa, around 100,000 years ago. Something game-changing happened, which reduced the population at the time to fewer than 10,000. From this group, modern humans emerged, growing rapidly in numbers and displacing other early human species such as Neanderthals.

A lot of theories have been proposed to explain this so-called evolutionary bottleneck, and subsequent exponential population growth. These include

gene mutation, cultural developments like language, as well as climate-changing events such as a massive volcanic eruption. But another factor is likely to have played a significant role, namely disease.

Scientists in the United States now believe that at some point between 100,000 and 200,000 years ago, an epidemic swept through the early Homo sapiens population, devastating its numbers, and leaving only individuals that had certain gene mutations as survivors.

One of those scientists, Ajit Varki, of the University of California, San Diego, says that whatever the culprit was, it may have hit youths the hardest. “We found two genes that are non-functional in humans, but not in related primates, which could have been targets for bacterial pathogens particularly lethal to newborns and infants.” As the professor of Medicine and Cellular and Molecular Medicine and co-director of the Centre for Academic Research and Training in Anthropogeny at UC San Diego tells *DCM*, the disease's youth policy may have been a particularly efficient way of harming the population. “Killing the very young can have a major impact upon reproductive fitness — and species survival can then depend upon either resisting the pathogen, or on eliminating the target proteins it uses to gain the upper hand.”

Varki argues that the inactivation of two genes related to the immune system (Siglec-17 and Siglec-13) may have given the ancestors of modern humans greater protection from two species of bacteria (*E coli* and *Strepto-cocci*) which cause sepsis and meningitis in





A BIOCONTAINMENT UNIT AT MIDDLEMORE HOSPITAL IN AUCKLAND IS READY TO RECEIVE PATIENTS WITH SUSPECTED EBOLA, IN THE UNLIKELY EVENT THE VIRUS REACHES NEW ZEALAND

human fetuses, newborns and infants. "In a small, restricted population, a single mutation can have a big effect, and a rare allele [an alternative form of a gene] can get to high frequency," he says.

Varki believes that this pathogenic menace may have functioned as a "selective sweep", leaving only a tiny population of anatomically modern humans remaining. As such, the seven billion or so descendants of those people today would possess a non-functional Siglec-17 gene, and are missing the Siglec-13 gene altogether.

As with many scientific answers, it may not be as simple as this. Varki also notes that it is "probable" that humanity's evolutionary bottleneck was the result of multiple, interacting factors: "Speciation (the process of evolving new species from existing ones) is driven by many things. We think infectious agents are one of them."

### IMMUNITY UP CLOSE

Of course, survival in the face of disease takes more than just good genes. Should we be taken ill, a complex interplay of factors, including our age, geography and ethnicity, will help to dictate when, and if, we will arise from our sickbed.

Professor Ivo Mueller is an infection and immunity expert with both the Walter and Eliza Hall Institute in Melbourne, Australia, and Spain's Centre for International Health Research in Barcelona (CRESIB). He has been part of a study exploring differing levels of resistance to malaria between populations in Africa and Papua New Guinea, and says it is very important to note that we have two levels of ►





► protection against diseases — the immune system and our genetic adaptations.

“Our immune system is the first line of defence. And because it is designed to adapt and evolve very rapidly in response to attack, most infections that we get are very efficiently handled by our immune responses,” he explains. “The adaptive nature of these immune responses means that we can keep up with rapid pathogen evolution, even though our lifespans are many, many times longer than those of our pathogens.”

## ANTIBODY GENES ARE ASSEMBLED FROM DNA SEGMENTS IN OUR GENOME AND ARE THEN IMPROVED THROUGH CYCLES OF ITERATION, MUTATION AND SELECTION

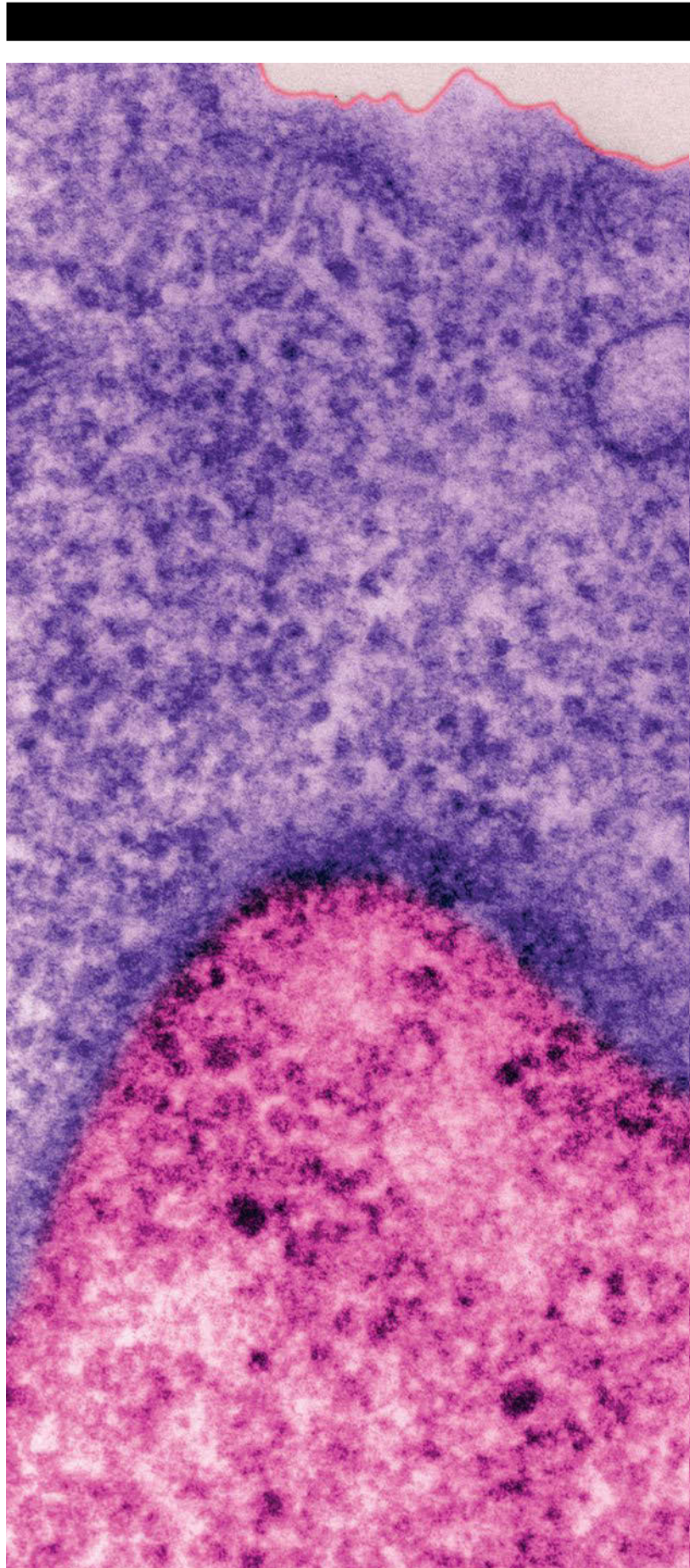
Each of us is born with an innate generalised protection against many pathogens that prevents us from getting common diseases, and their close relatives, that were also survived by our ancestors. We also gain passive immunity from external sources, such as through breast milk, which confers only temporary protection against diseases. Adaptive immunity develops over the course of our lives as we are exposed to diseases or vaccinations.

The immune system itself is made up of a collaborative network of cells, tissues, and organs. White blood cells, known as leukocytes, are a key part of this defence

system, and are found in the spleen, lymphatic system and bone marrow. Two types of leukocytes combine to seek out and destroy invaders: phagocytes consume the invading toxins, bacteria, viruses, parasites or fungi; while lymphocytes, which form in the bone marrow, help the body to recognise previous invaders.

Lymphocytes are also broken into two highly specialised groups. T lymphocytes (or T cells) base themselves in the thymus gland, and once they recognise an invader by its shape, will send chemical messages known as cytokines, to warn the rest of the immune system that an attack is imminent. B lymphocytes (B cells) also act as an intelligence service, gathering information about invaders, and dispatching waves of antibodies — specialised proteins that lock onto invading antigens and stop them in their tracks.

Antibody genes are assembled from DNA segments in our genome and are then improved through cycles of iteration, mutation and selection. All of these processes occur during the immune response. Between 20 and 40 mutations are required to get the right fit to lock onto and kill the invader. This is how the immune system gears up to fight back against viruses, such as the flu, which change subtly each year. Once they have defeated the source of an infection, these antibodies then remain in the body, ready to spring into action against any similar invaders. This is how cross-resistance and immunisation works. It also explains why, when once you’ve had a disease like chicken pox, you usually won’t get it again. Those





A MATURE HIV VIRUS  
INFECTION AND  
BUDDING RELEASE  
OF HIV IN HUMAN  
LYMPHATIC TISSUE

early human survivors of the evolutionary bottleneck multiplied rapidly and spread out across the world. But disease was not completely done shaping our genome, with bits of viral DNA even becoming incorporated into our own genetic blueprint.

“We know of many examples where infectious diseases have shaped our genome — and this is actually relevant to health problems today,” explains Dr Elinor Karlsson, a postdoctoral fellow at Harvard University’s Broad Institute, in the US.

As humans migrated, populations encountered distinct pathogens, and natural selection increased the prevalence of alleles, which were advantageous in both host and pathogens. Even today, this history influences human infectious disease susceptibility, and contributes to common diseases that show geographical disparities, such as autoimmune and metabolic disorders.

“In the past, people that got sick with these diseases were more likely to die. Those that didn’t get sick were more likely to survive and would have had more children,” says Karlsson. “When you think about it, evolution is an epic clinical trial that has been going on for thousands of years. We’ve been randomly changing our genome and figuring out whether that makes us healthier. Those that are healthier tend to stay around and those who are less healthy are weeded out.”

Advances in science now provide us with a powerful lens to help trace our species’ age-old battles with disease, she explains. “Now that we have these new genomic techniques where we can look at the entire genome, for the first time we have the power and ability to go back and figure out the results of that clinical trial.” ►

### WHAT ABOUT EBOLA?

With Ebola rates raising exponentially, do we have a pandemic on our hands? Despite inflammatory media reports, with appropriate control measures in place, Ebola is not easily transmitted, stresses infection and immunity expert Professor Ivo Mueller, as transmission depends on direct contact with the body fluids of an infected person. “The population risk of getting infected is actually relatively low,” he notes. “And this is why outbreaks of the disease can be stopped with good quarantine, even without treatment.”



## ► INVADER VERSUS HOST

Despite appearances to the contrary, it is not in the interests of virulent diseases to kill all of their victims, as they are ultimately writing their own death warrant as well. Instead, as our immune systems fight back against each attack, a kind of arms race develops between the invader and its host.

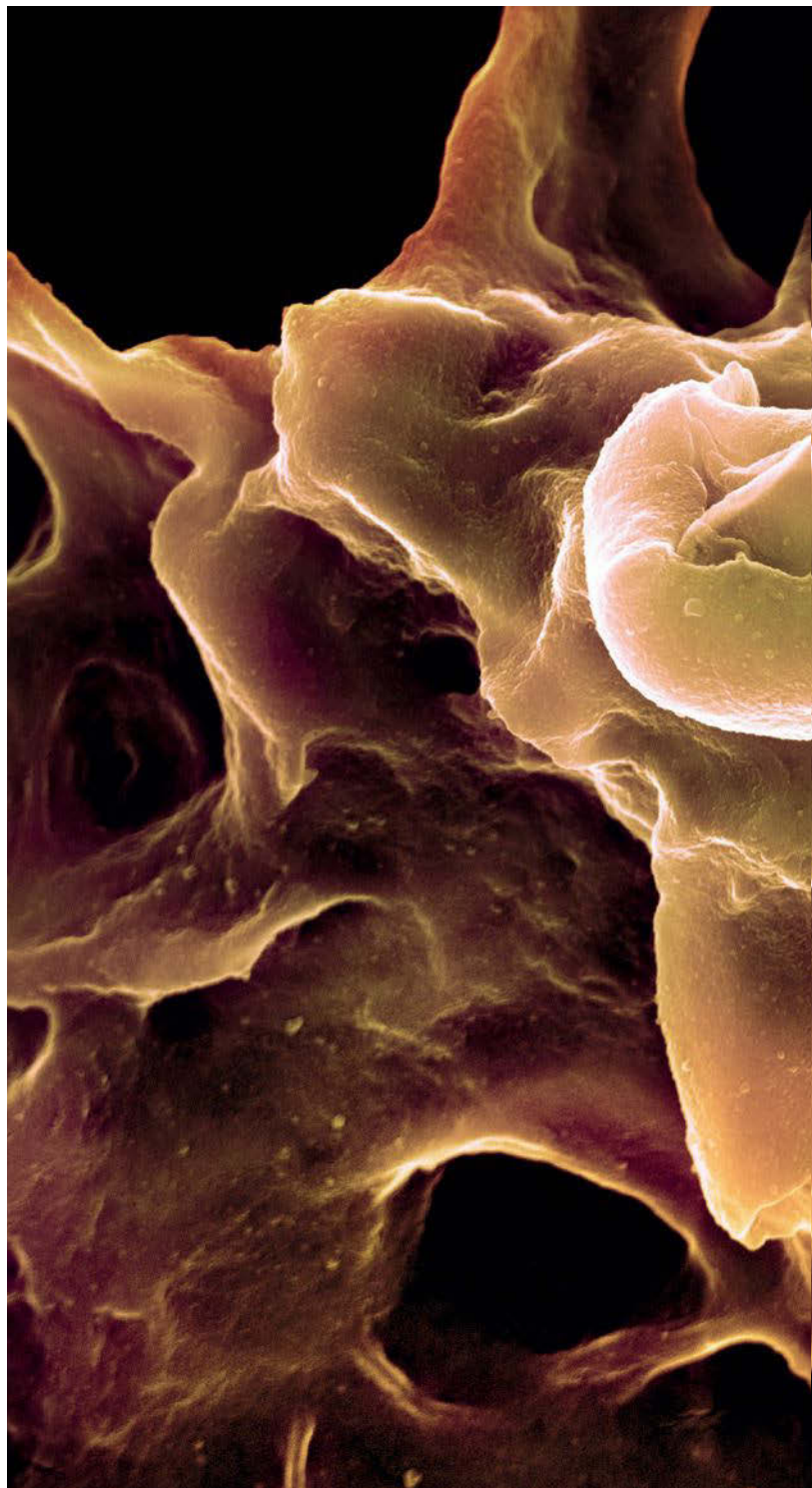


Mueller explains that in the case of malaria, for example, the interplay between the human immune response and the genetics of the Plasmodium parasite causing the disease, are very important in maintaining the equilibrium between humans and parasites. “If a parasite with a specific genetic make-up becomes more common, then more people will be exposed and develop immunity to this parasite,” he explains. “This then makes it difficult for the parasites to infect and/or survive in this population. And it exerts a selection

pressure for the parasite to change its genetic make-up.”

As he explains, this process is called balancing selection, and it is very typical in our relationship with our “old” pathogens. Malaria can in fact be caused by two different, related Plasmodium parasites. “Plasmodium vivax is thought to be an older human parasite than P. falciparum and has co-evolved longer with us,” Mueller notes. He adds that one result of this lengthy relationship is that even though P. vivax can cause severe disease and death, it is less frequent than for infections caused by the Johnny-come-lately P. falciparum.

In the case of Ebola, this relatively “new” disease has only recently jumped ship from fruit bats to monkeys, apes and humans. Non-human primates, like gorillas and chimpanzees, have been cited by the World Health Organization (WHO) as a possible infection source for humans. However, as Mueller notes, new data suggests that these primates were, like us, also “accidental hosts,” he says. “In other words, they catch the disease and then pass it along. But they are not the initial ‘reservoir’ source that provided the virus.” As he explains, it is now thought that the initial reservoir for Ebola was in fruit bats — and that the consumption of



PHOTOS GETTY IMAGES (MAIN), AFP

## MILESTONES IN IMMUNITY RESEARCH

### 430 BC A PLAGUE ON MOST HOUSES

THE GREEK WRITER THUCYDIDES DESCRIBES INDIVIDUALS WHO RECOVER FROM A PLAGUE THAT IS RAGING IN ATHENS. THUCYDIDES NOTES CURIOUSLY THAT PEOPLE WHO RECOVERED FROM THE DISEASE SOMEHOW BECAME EXEMPT FROM FALLING ILL AGAIN. “THESE KNEW WHAT IT WAS FROM EXPERIENCE, AND HAD NOW NO FEAR FOR THEMSELVES; FOR THE SAME MAN WAS NEVER ATTACKED TWICE — NEVER AT LEAST FATALLY”



### 541 AD SLOW LESSONS

PROOF OF HOW SLOWLY KNOWLEDGE MOVED UNTIL THE 20TH CENTURY LIES IN THE DESCRIPTION OF PROCOPIUS, A HISTORIAN WHO DESCRIBED ANOTHER PLAGUE, JUST AS PUZZLED AS THE GREEK ACADEMIC A THOUSAND YEARS BEFORE HIM. “STILL AT A LATER TIME IT CAME BACK; THEN THOSE WHO DWELT ROUNABOUT THIS LAND, WHOM FORMERLY IT HAD AFFLICTED MOST SORELY, IT DID NOT TOUCH AT ALL”




these bats may have started the outbreak.

The relative newness of the Ebola virus appears to partly explain why it has been so deadly. “Both the virus and humans are poorly adapted to each other, and as a consequence the disease is very severe and mortality is very high,” he notes. “This high mortality will then in turn exert a selection pressure on the human genome — and may also exert a selection pressure on the Ebola genome,” he says, before adding a chilling note. “Because killing your host is often not an ideal evolutionary outcome for a pathogen.”

### SPREAD THE WORD

Within any population, the percentage of people that catch a disease depends to a large extent on how easily the pathogen is transmitted. Influenza is transmitted very efficiently, and most people are exposed to it regularly, resulting in clinically mild infections. Some mutations are much more lethal to the population, such as the Spanish Flu that infected over 500 million people after the first World War — and killed an estimated 50 to 100 million of them — and H1N1 bird flu, which was responsible for more than 203,000 deaths during the 2009 pandemic.

“The risk of catching malaria depends on how ▶



MACROPHAGE WHITE BLOOD CELL (RED) ENGULFS A TUBERCULOSIS (MYCOBACTERIUM TUBERCULOSIS) BACTERIUM (GREEN). THIS PROCESS IS CALLED PHAGOCYTOSIS

**OPPOSITE** VOLUNTEERS WHO RESPONDED TO A NATIONWIDE APPEAL BY THE GERMAN RED CROSS TO HELP IN THE FIGHT AGAINST EBOLA IN AFRICA GET DECONTAMINATED DURING TRAINING AT THE BUNDESWEHR FACILITY

### 1718 CONSTANTINOPLE, KINGS AND COLONIES

LADY MARY WORTLEY MONTAGU, THE WIFE OF THE BRITISH AMBASSADOR TO CONSTANTINOPLE, OBSERVES THE PROCESS OF VARIOLATION (AN EARLY FORM OF VACCINATION) IN TURKEY. SHE DEMONSTRATES THE PROCEDURE, WHEREBY SMALLPOX PUSTULES ARE INHALED OR INSERTED INTO WOUNDS, TO THE FUTURE KING GEORGE I, WHO VARIOLATES TWO OF HIS GRANDCHILDREN. AT THE SAME TIME, THE PROCEDURE GAINS POPULARITY IN THE AMERICAN COLONIES THANKS TO A REVEREND WHO LEARNS THE PRACTICE FROM HIS AFRICAN SLAVE

### 1873 THE STIGMA OF LEPROSY

DR GERHARD HENRIK ARMAUER HANSEN OF NORWAY IS THE FIRST PERSON TO IDENTIFY MYCOBACTERIUM LEPRAE, WHICH CAUSES LEPROSY. THOUGH THIS PROVES THE DISEASE IS CAUSED BY A GERM AND IS NOT IN FACT HEREDITARY, AND NOR DOES IT ARRIVE FROM A CURSE OR SINFUL BEHAVIOUR, THE DISEASE CONTINUES TO BE FEARED TO THIS DAY. THIS, DESPITE THE FACT THAT 95 PERCENT OF PEOPLE HAVE A NATURAL RESISTANCE TO THE DISEASE





## MILESTONES IN IMMUNITY RESEARCH

### 1884 FROM COWS TO HUMANS

LOUIS PASTEUR ADVANCES THE WORK OF ROBERT KOCH AND EDWARD JENNER WHEN, WORKING WITH THE RABIES VIRUS, HE DEMONSTRATES THAT INOCULATION WITH A WEAKENED PATHOGEN CAN PROTECT AGAINST EXPOSURE TO A NATURALLY OCCURRING FORM OF THE PATHOGEN. IT IS PASTEUR WHO COINS THE TERM VACCINATION, HONOURING JENNER'S WORK WITH SMALLPOX AND COWPOX, A DISEASE THAT LEAPT FROM COWS TO HUMANS. VACCINATION COMES FROM THE LATIN VACCINUS, MEANING "DERIVED FROM COWS"

### 1955 YES TO LIFE, NO TO BILLIONS

AS WE WRITE THIS, UNICEF HAS RELEASED A TWEET: "THANK YOU JONAS SALK, BORN 100 YEARS AGO TODAY, WHO REFUSED TO PATENT POLIO VACCINE." TO SALK, IT WAS AN OBVIOUS CHOICE NOT TO PATENT HIS VACCINE ("COULD YOU PATENT THE SUN?" HE SNORTED), DESPITE THE FACT THAT AS A RESULT, HE MISSED OUT ON POTENTIAL EARNINGS OF US\$7 BILLION





THE VIBRIO CHOLERA BACTERIA THAT CAUSE CHOLERA IN HUMANS

RIGHT A HEALTH WORKER WALKS INSIDE A TENT IN THE EBOLA TREATMENT UNIT BEING PREVENTIVELY SET TO HOST POTENTIAL EBOLA PATIENTS AT THE UNIVERSITY HOSPITAL OF YOPOUGON IN CÔTE D'IVOIRE

► many mosquitoes there are and how often people are bitten,” Mueller explains. “In tropical areas where transmission is efficient, most people will be infected. Untreated malaria infections have around 15 to 20 percent mortality rates in previously unexposed adults, and less in children.”

And genetic adaptation increases that proportion significantly, he says. “However, immunity to (lethal) malaria is acquired very rapidly and already at a second episode the chance of dying is considerably reduced; and after three to five episodes mortality is close to zero.”

Recently, the process of decoding the human genome has revealed some surprising things about disease resistance. A study published in the prestigious journal *Nature* in October 2014 by a Swiss-led multi-national team demonstrates how some people are able to rapidly neutralise influenza viruses — which have been one of our most constant companions, and which we as a species know very well.

This is done by particular types of antibodies binding to haemagglutinin, a spike-shaped protein that protrudes from the surface of a virus and targets specific sugar chains in our cells. When it finds what it's looking for, the haemagglutinin binds to the

cell, and like a Trojan Horse, releases proteins that then take over the cell's functions.

Yet haemagglutinin is also the virus' Achilles heel. The multi-national team of scientists discovered that a particular type of antibody can neutralise multiple influenza viruses in a single mutation, by binding with a particular part of the haemagglutinin protein. Making these antibodies requires a particular gene segment (known as VH1-69) which is found in two different forms in the population. Only one form gives rise to the broadly neutralising antibody, which a large percentage of the population possess — allowing them to respond rapidly to viral infection.

Some people lack the gene segments and can't make these antibodies. However, they are still able to combine other gene segments to develop influenza fighting antibodies, though the process might take longer, and may not necessarily be as effective. Scientists are now hoping to use this discovery, to develop a vaccine that elicits the universal influenza antibody response.

In the meantime though, we can thank our ancestors for our ability to fight off a bewildering array of infections. Our innate genetic resistance is mostly due to ancestors having

been exposed to either the pathogen itself, or to one of its relatives. Mutations can also arise spontaneously — a person could have protection purely by chance — although these spontaneous mutations remain rare until they are selected for by an outbreak of a particular disease.

Mueller says these mutations may in fact be helping us fight an array of battles, some of which we are not even yet aware. “Many mutations that protect us



against dying from a disease affect genes that are involved not only in the response to specific pathogens, but may give us protection against a whole series of pathogens — even ones that we have never encountered,” he says. This phenomenon is known as cross-resistance. For example, an estimated one percent of people descended from northern Europeans are virtually immune to AIDS ►

## 1984 FUTURE SHOCK

ARGENTINE IMMUNOLOGIST AND MOLECULAR BIOLOGIST CÉSAR MILSTEIN RECEIVES A NOBEL PRIZE FOR HIS WORK ON MONOCLONAL ANTIBODIES (LAB-PRODUCED MOLECULES WHICH ATTACH TO SPECIFIC DEFECTS IN CELLS). “ALTHOUGH THE WAY AHEAD [FOR IMMUNOLOGY] IS FULL OF PITFALLS AND DIFFICULTIES, THIS IS INDEED AN EXHILARATING PROSPECT,” MILSTEIN SAYS DURING HIS NOBEL LECTURE. “THERE IS NO DANGER OF A SHORTAGE OF FORTHCOMING EXCITEMENT IN THE SUBJECT. YET, AS ALWAYS, THE HIGHLIGHTS OF TOMORROW ARE THE UNPREDICTABILITY'S OF TODAY”

## 2008 THE POWER OF ALLIGATOR BLOOD

PUZZLED AS TO HOW ALLIGATORS ARE ABLE TO SHAKE OFF WOUNDS FROM RIVALS THAT SHOULD BECOME INFECTED, RESEARCHERS ANALYSE THE ANIMAL'S BLOOD FOR CLUES. THEY FIND THAT THE AMERICAN ALLIGATOR CAN SUCCESSFULLY DESTROY 23 STRAINS OF BACTERIA — AND IS EVEN ABLE TO DESTROY A SIGNIFICANT AMOUNT OF HIV CELLS. FRAGMENTS OF PROTEINS KNOWN AS PEPTIDES HELP STAVE OFF INFECTIONS



► infection — particularly those with Swedish heritage. People with the highest level of HIV immunity all possess a pair of mutated genes that prevent immune cells from developing a receptor (known as the CCR5 receptor) which acts like a lock that the AIDS virus can pick and break through. Without this lock though, the AIDS virus cannot break into the cell and take it over.

## ACCORDING TO DR ELINOR KARLSSON, EVOLUTION IS AN EPIC CLINICAL TRIAL THAT HAS BEEN GOING ON FOR THOUSANDS OF YEARS

What is particularly fascinating about this is that although HIV is a relatively new virus, researchers who have engaged in a kind of molecular archaeology estimate that the mutation has in fact been around since the Middle Ages. It is thought that HIV may have evolved to protect us against smallpox or possibly dysentery, both misery-causing diseases that plagued humanity for thousands of years.

PHOTO: CORBIS

Other mutations are also known to confer protection against disease. For example, people who inherit one of two mutations necessary to develop sickle cell anaemia, can end up with additional resistance to malaria.

Mueller says that despite a decade of breakthroughs in medical genomics and in understanding disease and its causes, researchers still don't fully understand why a mutation in a gene that encodes a part of our haemoglobin (which transports oxygen in the blood) known as the alpha-chain, might protect us against such a diversity of infectious disease.

### ETHNIC RESISTANCE?

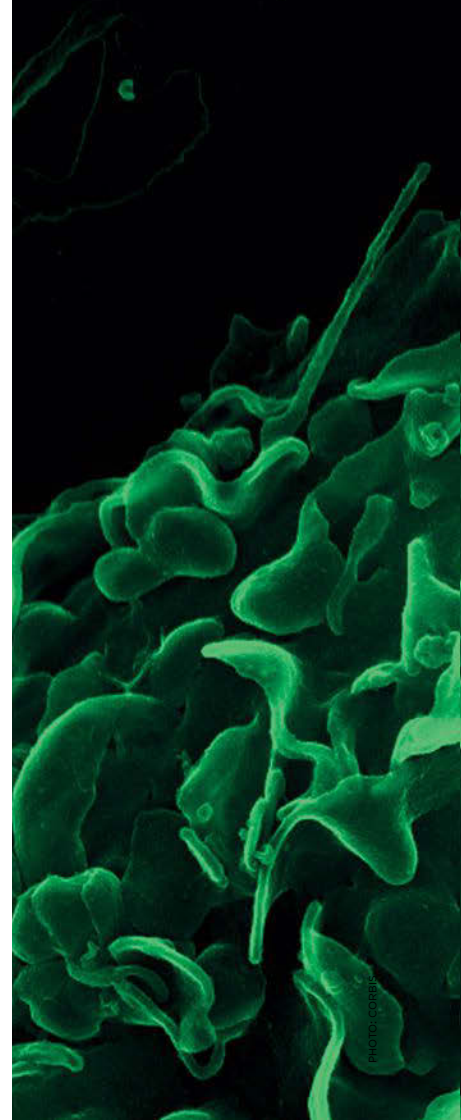
In finding out how to fight diseases, one crucial aspect is identifying which parts of our population fight it better than others — and then asking why this may be so. For example, as Ebola continues its seemingly inexorable march across West Africa, and the quest for a vaccine and effective treatment frantically continue, one population seems to have developed a natural resistance to the disease. A study by French scientists found antibodies to the virus in 15 percent of rural Gabonese communities — even in those areas where there has never been an Ebola outbreak. These scientists were led to believe that

the people may have come into contact with the virus, possibly in fruit contaminated by the saliva of Ebola-carrying flying foxes. They found higher levels of resistance in forest zones (as high as 33.4 percent in some villages) where bats and other possible Ebola vectors are found, compared with less biodiverse lakeside areas.

The fact that some ethnic groups are prone to certain conditions is not new; but the genetic reasons underpinning susceptibility to disease are only now becoming apparent. Men born in the Caribbean have a 50 percent higher mortality from stroke than general population, while the prevalence of angina and stroke are lower in the Chinese. In the studies, known risk factors like smoking, blood pressure, obesity and cholesterol failed to account for ethnic variations.

In 2013, North American scientists discovered that many antibody genes, and potentially how well they function and what they fight off, vary between people. This could mean that even though our drugs, treatments and vaccinations are designed to treat whole populations, our response to pathogens and their diseases, may in fact be as unique as we are. Antibodies are typically composed of two immunoglobulin (or Ig) heavy chains and two light chains, ►

WHITE BLOOD CELL PHAGOCYTE WRAPS ITSELF AROUND MYCOBACTERIUM TUBERCULOSIS BACTERIA, THE CAUSATIVE AGENT OF MOST CASES OF TUBERCULOSIS



## MILESTONES IN IMMUNITY RESEARCH

### 2010 AIDS SHIELDS

SCIENTISTS CAUTIOUSLY THINK THEY HAVE SOLVED THE MYSTERY OF WHY SOME PEOPLE EXPOSED TO HIV DO NOT CONTRACT AIDS. FOR YEARS, THEY HAVE DUBBED THESE PEOPLE "LONG-TERM NON-PROGRESSORS", BUT AS MANY DID NOT SUCCEED TO AIDS, THEY RENAMED THEM "HIV CONTROLLERS". DIFFERENCES IN GENES THAT CONTROL PROTEINS OF THE IMMUNE SYSTEM MAY BE RESPONSIBLE

### 2013 CANCER HUNTERS

SCIENTISTS AT THE UNIVERSITY OF PENNSYLVANIA "TEACH" THE IMMUNE SYSTEM OF A 14-YEAR-OLD LEUKEMIA PATIENT TO BECOME MORE ADEPT AT KILLING CANCER CELLS. THE EXPERIMENTAL THERAPY INVOLVES REMOVING THE PATIENT'S T-CELLS, CRUCIAL IMMUNITY SOLDIERS, AND TRANSFERRING IN NEW GENES THAT TRANSFORM INTO "HUNTER" CELLS. TWENTY-TWO YOUNG PEOPLE ACT AS SUBJECTS FOR THE STUDY. NINETEEN OF THEM GO INTO REMISSION. "WE'VE ENTERED INTO A WHOLE NEW REALM OF MEDICINE," AN ONCOLOGIST TELLS THE PRESS



## SINKING SHIPS

Given that many emerging diseases make the jump from animals to humans, you could be forgiven for thinking that eradicating the carriers might stop the problem. In fact, wholesale eradication of known host species could actually make things much worse.

A 2010 study by Dr Rob Dunn from North Carolina State University explored a host of factors thought to be involved in the global distribution of disease-carrying organisms. He found that geographic regions with a rich diversity of birds and mammals, such as the wet tropics, are correlated with the presence of lots of pathogens, probably because the same environmental factors have influenced patterns in diversity of human pathogens that have patterns in the diversity of the rest of life, including the birds and mammals.

But reducing bird and mammal diversity will not remove the diseases, Dunn stresses. On the contrary, making wild birds and mammals rarer seems likely to increase the diversity of human diseases, with diseases on stressed or rare mammals and birds all too eager to jump from their sinking ships and into new hosts — as has happened repeatedly in recent years.

"We imagine that we have nature under control — but nobody seems to have told nature," Dunn notes. "The environment and, in its broadest sense nature, determines the number of kinds of diseases in different regions of the world, in much the way that it has influenced the number of kinds of birds, mammals, ants or bees."

However, Dunn believes we should optimise our investment in disease control in places where current spending is low and populations are large, as these are likely to be places where the most people will be saved by additional efforts. Examples include India, Pakistan and East African nations along the equator.

"Current healthcare spending is quite low, prevalence of pathogens is quite high, and human populations are large in these areas — so it makes sense to target efforts there," Dunn asserts.



### 2014 TIPPING POINT



PROFESSOR JEREMY FARRAR, DIRECTOR OF THE WELLCOME TRUST, A CHARITABLE HEALTH FOUNDATION, WARNS PRESS THAT RESISTANCE OF DISEASE TO ANTIBIOTICS IS REACHING A TIPPING POINT — POSSIBLY WITH DISASTROUS CONSEQUENCES. "THIS IS HAPPENING NOW," HE SAID ON BBC RADIO. "WHAT WE WILL SEE IS PEOPLE ACTUALLY SPENDING LONGER IN HOSPITAL, PATIENTS GETTING SICKER AND HAVING COMPLICATIONS AND DYING. AND IT WILL CREEP UP ON US ALMOST WITHOUT NOTICING"

"This will not be the sort of contagion-like event of somebody landing from Hong Kong in London with a pneumonia that is emerging that we've all feared. This will creep up on us insidiously, and of course that's in many ways more difficult to cope with."

PROFESSOR JEREMY FARRAR



## MICROBIAL RESISTANCE



Not all resistance is a good thing. The widespread use of antimicrobial drugs in the past 50 years has resulted in the growing problem of antimicrobial resistance, as microorganisms, including bacteria, fungi, viruses and parasites, fight back against attempts to eradicate them, leading to a rise in so-called "superbugs".

Resistant microorganisms are able to withstand attack by antimicrobial drugs, such as antibiotics, antifungals, antivirals, and antimalarials, so that standard treatments can become ineffective and infections persist, thus increasing the risk of spread to others.

Resistant strains evolve naturally when microorganisms spontaneously mutate when replicating themselves, or when resistant traits are exchanged between them. The use and misuse of antimicrobial drugs, as well as poor hygiene practices, accelerate the emergence of drug-resistant strains.

Antibiotic resistance is now occurring frequently in bacteria that cause common infections, such as urinary tract infections, pneumonia and bloodstream infections throughout the world. In such cases, patients with drug-resistant infections can remain sicker for longer, or may even die from infections that have previously been easily treatable.



MACROPHAGE ENGULFING BACTERIA AS PART OF THE IMMUNE SYSTEM'S RESPONSE TO INFECTION

PHOTO © CORBIS





► and when the scientists sequenced the part of human chromosome 14 containing the one million nucleotide-long immunoglobulin heavy (IGH)-chain gene region, they made an intriguing discovery.

Dr Corey Watson, a postdoctoral researcher at the Mount Sinai School of Medicine in New York, told *DCM*, “Building on previous knowledge, we found, sections of the IGH-chain locus’ DNA sequence are either missing or inserted into a person’s genome - in the region that determines our antibody gene count and diversity,” he notes. “And this could vary depending on ethnicity.”

Scientists have long known that the IGH-chain locus produces the 50-plus antibody-encoding genes that our B cells use to fight off infections and diseases. When Watson and his colleagues subsequently screened the chromosomes of 425 people of Asian, African and European descent, they identified 11 potential large DNA insertions and deletions of antibody-encoding genes, which in some cases have been implicated in disease susceptibility. “It’s early days,” emphasises Watson, “but the findings could mean that past environmental exposures to certain pathogens have caused these DNA insertions or deletions to increase in frequency in different ethnic groups, which could impact disease risk.”

“In the context of our antibody work, research like the influenza-neutralising antibody discovery is important as it hints at a potentially important functional role for IGH genetic variation, and does so in the context of a very important infectious disease, the flu,” he says. “Such findings also suggest that in some cases we may need to

incorporate information on genetic variation into the way we think about the immune response, particularly when identifying at-risk individuals that may benefit from more targeted treatments.”

Watson says that at this point, he is unaware of any clear examples of entire populations being resistant to particular diseases. “But there does seem to be some speculation that some individuals within populations may be more resistant to particular infectious diseases than others.” He notes, “Whether resistance is due to genetics, or some other underlying factor, is not clear.”

**MEN BORN IN THE CARIBBEAN HAVE A 50 PERCENT HIGHER MORTALITY FROM STROKE THAN THE GENERAL POPULATION, WHILE THE PREVALENCE OF ANGINA AND STROKE ARE LOWER IN THE CHINESE**

Mueller agrees. “What happens when a population is exposed to a new pathogen depends on the type of pathogen. And if we, either in our lifetime or as a population, have been previously exposed to related pathogens,” he says. “Even when we think we are developing an understanding of a particular disease, such as *Thalassemia*, the more we learn, the more we find there is to discover.” ●



# THE DESIGNERS HAVE GONE WILD



SO, WE NEEDN'T PUFF UP WITH PRIDE AT OUR ARCHITECTURAL ABILITIES. IT TURNS OUT THAT THE ANIMAL KINGDOM DOES A Fancier AND MUCH MORE JAW-DROPPING JOB AT BUILDING THEIR HOMES THAN WE EVER IMAGINED.

**RACHEL SULLIVAN** TELLS US JUST HOW

PHOTOGRAPHY BY INGO ARNDT,  
NATURE PICTURE LIBRARY





## EURASIAN COLLARED- DOVE

THIS US INHABITANT IS EASILY IDENTIFIABLE WITH THE BLACK COLLAR ON THE BUFF-GRAY BODY. THIS SLIGHTLY LARGER COUSIN OF THE MOURNING DOVE BUILDS A DELICATE-LOOKING NEST OF TWIGS ON PALM TREES OR SOMETIMES ON MANMADE STRUCTURES AS WELL



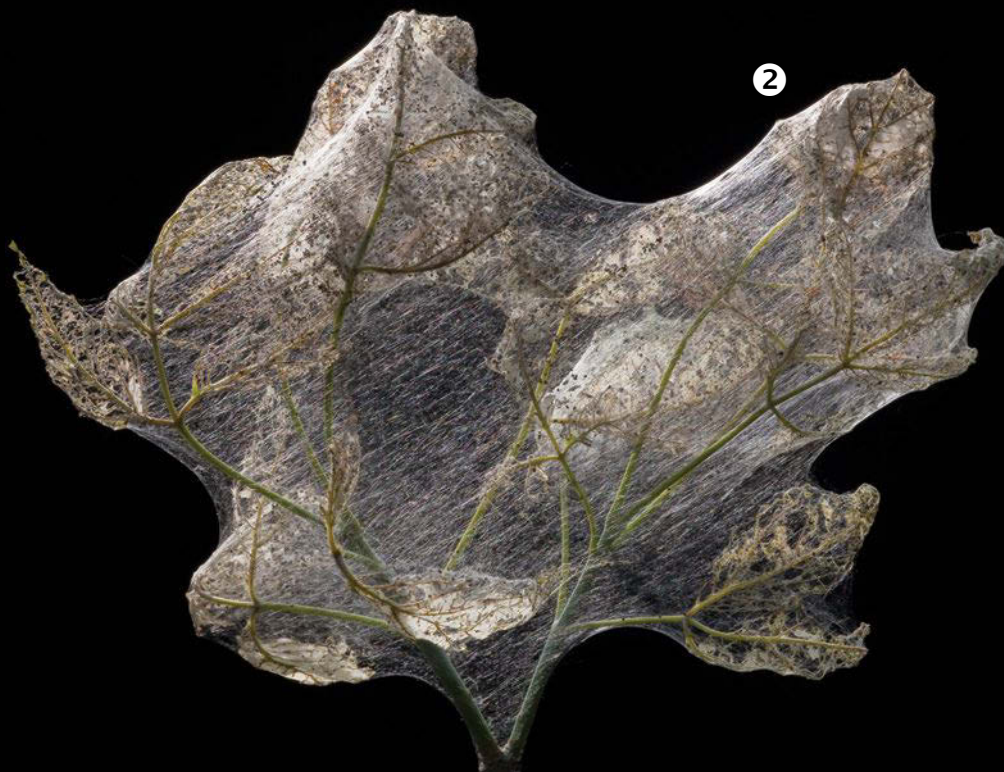
# A

nimal architecture is everywhere. From the Great Barrier Reef, created by the calcium secretions of billions of tiny coral polyps, to beavers, the master hydraulic engineers of the animal kingdom — and onto the sticky, deadly, gossamer spider webs, bee hives, termite mounds, plus an almost infinite variety of birds' nests.

Scientists and naturalists have long pondered these amazing designs, and are only just beginning to understand how it is that some of these extraordinarily complicated structures are built. Understanding this better promises to be a significant leap for science: these structures take skill, intelligence and a capacity to learn from their mistakes — traits once thought to belong solely to humans.

According to Mike Hansell, the Emeritus Professor of Animal Architecture at the University of Glasgow, animals predominantly build structures to provide a secure refuge that's protected from extreme cold and heat, and from predators. Just like us.

"Nests, burrows, and cocoons, all are homes in this sense," he writes in his book *Built by Animals: The Natural History of Animal Architecture*. "They may of ►







## BAYA WEAVER

1 CONSIDERED AN ARCHITECTURAL MARVEL, THE BAYA WEAVERS' NESTS HANG ON TREES LIKE UPSIDE DOWN FLASKS. BUILT BY THE MALE BIRDS, THE NESTS ARE MADE WITH FRESH GREEN GRASS AND TURN BROWN AS THE GRASS DRIES. THE NESTS ARE SO WELL-ATTACHED TO THE TRESS THAT IT IS ALMOST IMPOSSIBLE TO REMOVE THEM WITHOUT DESTROYING THEM



## BUFF TIP MOTH

2 FOUND MOSTLY IN THE UK, THESE MOTHS RESEMBLE TWIGS WHEN AT REST. THEY WEAVE A PROTECTIVE WEB WITH THEIR SALIVA, COVERING THE CATERpillARS AND THE FOOD PLANT



## EURASIAN PENDULINE TIT

3 THIS SPARROW-LIKE BIRD IS WIDELY FOUND IN EUROPE AND ASIA. ITS NEST, RESEMBLING THAT OF THE BAYA WEAVER'S, IS WOVEN SO TIGHTLY AND IS SO STRONG THAT IT CANNOT BE TORN APART EVEN BY EVEN THE STRONGEST ANIMALS!









2

► course be more than simply secure places. Like our own homes, they may have additional features: food stores, waste disposal and even food production areas.” Indeed, some even have their own ventilation systems.

### BUILT TO LAST

Prairie dogs, for instance, dig burrows out of the ground on the Great Plains of North America that withstand extreme temperatures, floods and fires — and feature a range of purpose-built chambers for storing food, listening for predators or raising the young. Their interconnected “towns” can reach vast scales. One example was a town dating back to before human settlements, and found in Texas in 1900 — covering about 65,000 square kilometres and home to approximately 400 million prairie dogs.

Plus, beneath the ground’s surface lie the nests of South American leafcutter ants, which can reach six metres deep and contain eight million adult ants. The colony is sustained by the constant import of freshly-cut pieces of leaves, which are chewed up and used as compost, to nurture the fungi grown in special fungus gardens, fueling the colony’s food supply.

This subterranean labyrinth is ventilated using a smart system of chimneys that have been seen to draw air through the nest. This is a mechanism that is also found in the mounds of some termites, the burrows of some rodents and, in the water, by some burrow-dwelling fish and also in the mud shrimp.

Northern Australia’s magnetic termites take this one step further. Cemetery-like fields of the two metre ►



## HARVEST MOUSE

**1** HARVEST MICE ARE EUROPE’S TINIEST RODENTS WITH AMAZING PREHENSILE TAILS THAT ACT LIKE AN EXTRA LIMB, HELPING THEM CLIMB QUICKLY THROUGH DENSE HEDGEROWS AND CROPS. THEY BUILD VERY PECULIAR, BALL-LIKE GRASS NESTS A METRE ABOVE THE GROUND IN THE SUMMERS, FOR BREEDING. ONE MORE NEST IS BUILT CLOSER TO THE GROUND IN WINTERS TO SLEEP AND STORE FOOD



## CADDISFLY

**2** THESE MOTH-LIKE FLIES HAVE AQUATIC LARVAE, CHIEFLY FOUND IN STREAMS, RIVERS, LAKES, PONDS AND BRIEF WATER POOLS. THEIR LARVAE ARE AQUATIC ARCHITECTS AND BUILD TINY CASES WITH SAND, GRAVEL, TWIGS, ETC., THAT ARE HELD TOGETHER WITH THE SILK FROM THEIR SALIVARY GLANDS. THESE CASES HAVE TWO OPEN ENDS TO DRAW IN OXYGENATED WATER





► tall, thin, tombstone-style mounds not only feature arches, tunnels, chimneys, insulation and nursery chambers, but they're also aligned north to south, to minimise the exposure to the sun.

"There are essentially only two other functions of animal-built structures: as traps or as displays," Hansell adds. The most obvious trap builders are spiders, while the bowers of the male bowerbird in Australia serve only to attract mates with the elaborate, colour-coded displays that they have.

### TRIAL AND ERROR

But how do so many different animals, many of them not regarded as highly intelligent, know how to build such elaborate and seemingly scientific structures?

As with any new human building project, an animal's design comes down to need, and to using what nature has given them. This includes the brainpower required to plan, design and manipulate materials — whether they are gathered from the environment or produced from an animal's own body. Tools also include the body parts, beaks, hands, feet, teeth, claws, tails, spinarets and pincers, required to actually build their structure.

While it's hard to scientifically measure the motivations of a termite, a coral polyp or a species of shrimp, scientists can make some generalisations. The choices an animal makes about the sort of nest to build, its location, and the material used to build it, will have a significant impact on its success. Whether it be a shelter, a place to raise a family or attract mates, or even as a trap for prey. Because of its importance, nest building has long

been assumed to be largely genetically predetermined: after all, even inexperienced juveniles can build close approximations of the structures created by adults.

Recently though, genetics has been shown to be only a part of the picture, following a spate of recent studies on birds, the most ubiquitous vertebrate nest builders. These have revealed that instead of following an innate nest template and relying on materials dictated by genetic preference, birds in fact use trial, error and example to learn to choose the best building materials and techniques, enabling them to build their dream home.

One study focused on zebra finches. In the wild, they construct their nests with dry grass and fine twigs chosen for camouflage and to provide a secure place to raise their young. To work out how they choose one building material over another, Dr Ida Bailey from the University of St Andrews in Scotland, offered one group of captive finches flexible, floppy string to build with — then stiffer, more structurally sound string to another group.

Both groups of birds were then offered a choice between the flexible and the stiff string, with the birds that had been made to build floppy nests immediately opting for the more rigid building material. "We found that zebra finches prefer the stiffer string, which is more efficient for them to build with — they can build a nest with fewer materials," notes Dr Bailey.

The value of learning when it comes to nest building was further underscored by scientists studying the intricately woven grass nests of southern masked weaver ►



## BARK BEETLE

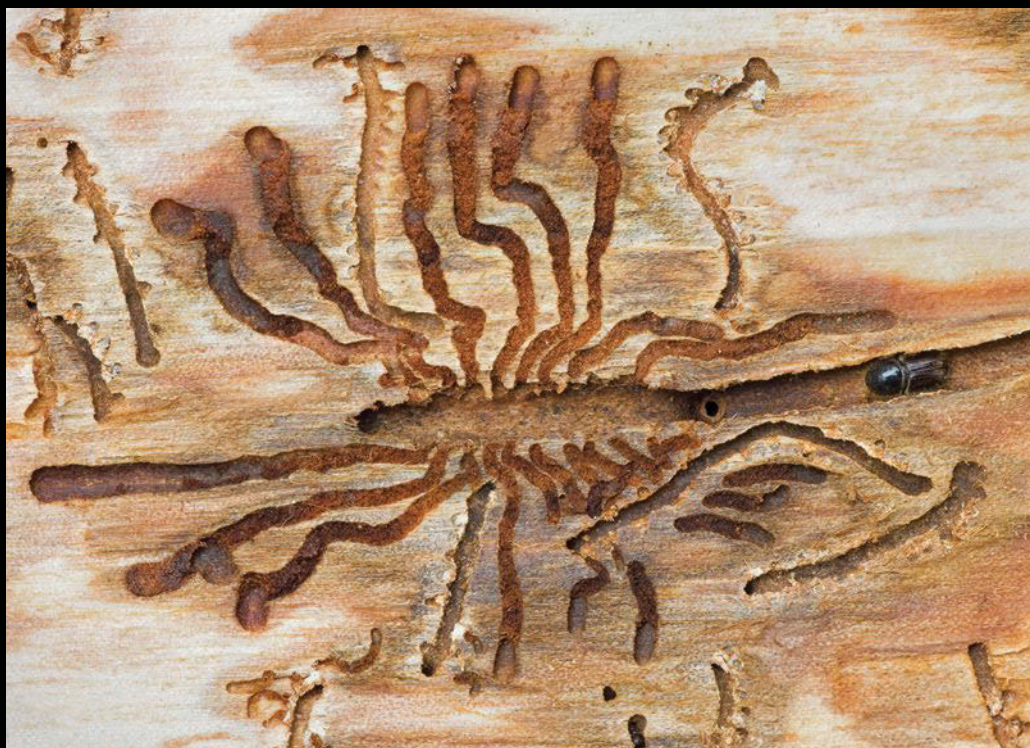
**1** BARK BEETLES LIVE IN THE WESTERN CONIFEROUS FORESTS, AND ARE CONSIDERED THE MOST DESTRUCTIVE FOR TREES BECAUSE OF THE HABIT OF MINING AND LIVING IN THE TREE BARKS AND SHRUBS. AT THE LARVAL STAGE, THE BEETLE LIVES ON THE ORGANIC PHLOEM PART OF THE TREE, CREATING NEST-LIKE STRUCTURES ALL OVER THE BARK. THIS IS WHERE THEY FEED ON ALL THE NUTRIENTS



## RED WOOD ANT

**2** THESE MOUND-BUILDING ANTS, BELONGING TO THE GENUS FORMICA, ARE FOUND WHERE THERE IS A LOT OF DEAD, DRIED WOOD AVAILABLE. THEY BUILD NESTS THAT RESEMBLE MOUNDS OF MUD, IN THICK VEGETATION. THE MOUNDS PROTECT THE ANTS FROM EXTREME WEATHER CONDITIONS AND ALSO PROVIDE A SAFE INCUBATION SPACE FOR THEIR EGGS





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## STEELY-VENTED HUMMING BIRD

**1** THIS MEDIUM-SIZED HUMMINGBIRD IS CHIEFLY FOUND IN CENTRAL AND SOUTH AMERICA. THEIR INTRICATELY WOVEN NEST IS MADE FROM DRIED LEAVES, PLANTS, TWIGS AND COBWEBS, AND NEATLY DECORATED FROM THE OUTSIDE WITH LICHEN. THIS STRONG CUP-LIKE HOME HELPS THE FEMALE TO INCUBATE TWO EGGS



## REED WARBLER

**2** THIS BIRD VISITS THE UK DURING ITS BREEDING SEASON IN THE SUMMERS, AND CONSTRUCTS ITS NEST NEATLY BETWEEN TWO TO THREE STEMS. THE SLING-LIKE NEST IS BUILT WITH STRINGS, TWIGS AND DRIED STRAWS, IN WHICH THE FEMALE LAYS THREE TO FIVE EGGS

► birds in Botswana. They found that individual birds varied their techniques from one nest to the next, with some birds having a preference for building their nests from left to right, and others from right to left. They also found, as the birds gained experience at weaving and knotting grass to build their nests, they in turn dropped fewer building materials.

"If birds built their nests according to a genetic template, you would expect all birds to build their nests the same way each time," explains Dr Patrick Walsh of the University of Edinburgh's School of Biological Sciences. "However this was not the case. Southern masked weaver birds displayed strong variations in their approach, revealing a clear role for experience. Even for birds, practice makes perfect," he noted.

Having the right brain for the job helps too. Other research has shown that a large well-folded (foliated) cerebellum, a structure in the brain that involves complex motor skills, procedural learning and planning, produces more structurally complex nests.

"Bird species that build more structurally complex nests, have greater cerebellar foliation than do species that build simpler nests," according to biologist Dr Zachary Hall from the University of St Andrews.

"Other processes involved in nest construction behaviour that are also supported by the cerebellum, such as motor sequencing and learning, may also explain the correlation between nest complexity and cerebellar foliation," he added.

The cerebellum is crucial for male bowerbirds which build elaborate display ►





2





# CORAL

HARD CORAL (MEANDRINA MEANDRITES) FROM COLUMBIA, IS A CLASSIC BRAIN CORAL, FORMING HEMISPHERES WHICH CAN REACH AROUND 1 METRE



## A JOURNEY OF PATIENCE

SHOOTING IN LOCATIONS THAT RANGED FROM JUST OUTSIDE HIS FRONT DOOR, TO TERMITE MOUNDS IN NORTHERN AUSTRALIA, GERMAN WILDLIFE PHOTOGRAPHER INGO ARNDT SHOT THE IMAGES, *ANIMAL ARCHITECTURE*, RELEASED IN 2014. HE TALKS ABOUT HOW TOUGH PICKING HIS FAVOURITE IMAGES WAS

"The picture of the baya weaver with the male bird arriving at the nest with a blade of grass in its beak is one of them," he says. "It was hard to get the right composition and everything in focus, because the nest was moving from the wind." In terms of a challenge, one of the toughest



shoots was in the South Pacific. "Taking the pictures from the bowerbird's bowers in West Papua was not easy. I had to organise an expedition with porters, cook and guides — we set up a camp high in the Arfak Mountains Rainforest and searched for the bowers. It took us one week and over 20 bowers before we found perfect ones with a very pretty decoration. It was one of my most beautiful but also most strenuous trips." Arndt has had a longtime fascination with the subject, spanning his two decades in the

field. "During many of my photo stories, especially when I took macro images, I saw a lot of animal architecture — and it was always fascinating what little animals like wood ants or caddis fly larvae can build," he notes. Yet getting the details perfect was another matter. "I decided to photograph a portion of the subjects in the studio in front of a black background. I hoped that these studio shots, in combination with the subjects that often are created under extreme conditions out in nature, would provide the right mix for this topic."




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# GOLD RUSH

STARTS 16<sup>TH</sup> FEB | MON TO FRI 10PM

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## WASP

THIS PARASITIC INSECT, WHICH IS NEITHER A BEE NOR AN ANT, IS CRITICALLY IMPORTANT IN THE NATURAL CONTROL OF INSECT PESTS. WASPS CONSTRUCT THEIR NESTS CHIEFLY FROM WOOD PULP; AND THE POTTER SPECIES CREATE FINE, POT-LIKE MULTIPLE CELLED NESTS FROM MUD, TWIGS, ETC, AGAINST WALLS OR TREES



► bowers that are decorated with collections of coloured objects. Research in 2005 found that the size of a species' cerebellum increases with the complexity of the bowers it produces.

### RIPPLE EFFECT

Attractive or intriguing though they may be, the structures produced by animal architects also go well beyond serving their own needs. Over time, they can

also fundamentally change their local landscape and increase biodiversity. For example, by felling trees, beavers open clearings for new growth and create wetlands that bring in invertebrates, fish and frogs, as well as the things that live on them.

Coral reefs grow slowly over time and are equivalent to tropical forests for the richness of their biodiversity; while lizard

and bird species happily nest in termite mounds. Even the humble earthworm, which chews its way through huge quantities of dirt and mud each year, enriches and improves the soil so that other plants and animals can thrive on its castings.

It is only humans, arguably the greatest animal architects of all, who seem to have a gift for doing the opposite for the land around us. "Humans are the dominant habitat-altering

species," agrees Mike Hansell. "No other single species has altered the world so much by their building activity."

Hopefully though, the lessons we're now learning from our animal colleagues in the design school of life, might help us somehow turn a corner in terms of our own more earth-friendly designs. "Now it is the turn of humans to attract species to the new habitats we have built," he says. ●





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# WHAT'S ON

THIS MONTH ON DISCOVERY CHANNEL





## Beast Tracker

Aliens are invading... not from a distant planet but right where we live. From the murky alligator swamps of Louisiana to Hawaii's pristine but deadly waters with the snake-infested waterways of Florida and the hog-ravaged plains of Texas thrown in humans are struggling to find a balance between conservation and survival, as deadly animals increasingly find their way into our everyday lives. Dr Andrew West is the BEAST TRACKER and he's on a mission to investigate the "alien invasion" and the fine line between thrive and survive.

AIRS EVERY THURSDAY 9 PM STARTING FEBRUARY 19





# Gold Rush

Returning for this season is Parker, who is setting a lofty goal to double his take. Todd is also back after hitting rock bottom in the jungles of Guyana, South America, where he lost his land, most of his money and ultimately his crew. Finally, Tony aka “The Viking,” and his team return after buying a \$1 million, 75-year-old floating gold dredge he hopes will be his ticket to wealth.

**AIRS EVERY MONDAY TO FRIDAY AT 10 PM,  
STARTING FEBRUARY 16**







## Running Wild with Bear Grylls

In *Running Wild with Bear Grylls*, the famed adventurer and survivalist Bear Grylls will take six celebrities into the wildest and most remote locations in the U.S. and around the world for a 48-hour journey of a lifetime. The celebrities who will be partnered one-on-one with Grylls in their own stand-alone episodes include actor Zac Efron, actor-director Ben Stiller, actor Channing Tatum, NFL Hall of Famer Deion Sanders, actor Tom Arnold and MSNBC & Today anchor Tamron Hall.

AIRS EVERY FRIDAY TO SUNDAY AT 9 PM, STARTING FEBRUARY 13

## Savage Family Digger

In this season of *Savage Family Diggers*, former Pro-Wrestler Ric Savage is making major changes to the nation's leading artifact recovery company American Savage by turning his quest for America's buried history into a full-fledged family business. To keep the business afloat, Ric must weather this family storm, unearth more hidden treasures and learn how to be the Boss, the Husband, and the Dad, all at the same time.

AIRS EVERY MONDAY TO FRIDAY AT 10 PM  
STARTING FEBRUARY 2





# BANDHAVGARH

NATIONAL PARK WITH A RICH HISTORICAL PAST

One of the reasons that makes Bandhavgarh National Park popular among wildlife lovers is the fact that it is the original home of the white tiger. Comparatively smaller in size from other national parks of Madhya Pradesh, it however, wins the race in the highest density of tiger population in India. As for the white tiger, the rare species of tiger could be seen in the then Rewa state for many years. The last alive was hunted by Maharaja Martand Singh in 1951, and stands as a testimony as a stuffed one in the Rewa Palace.

**T**he forests of Bandhavgarh before they were converted into a sanctuary were the game preserve of the Maharajas of Rewa. Situated in the Umaria district of Madhya Pradesh, Bandhavgarh national park covers an area of 448 square kilometers. The eponymous hill, Bandhavgarh stands tall right in the midst of the forest, accompanied by smaller hills and gently sloping valleys, which open up to small, swampy meadows. On the top of the hill stands Bandhavgarh Fort dating back to almost 2000 years old. Various dynasties have reigned from the fort, for example, the Maghas from the first century AD, the Vakatakas from the 3rd century AD, the Sengars from the 5th Century AD, and the Baghels till 1617 when Vikramaditya Singh moved his capital to Rewa. Civilisation ceased to exist from 1935. The last inhabitants deserted the fort in 1935. Dotted in the park are many intriguing caves. The vegetation varies from Sal forests in the valleys and lower slopes, to deciduous forest on the hills on the arid areas of the park. Bandhavgarh is best visited from mid-October to February-end. The major attraction being the big cat, Bandhavgarh also teems with a variety of wildlife such as sambar, barking deer, nilgai, which are easily available for wildlife lovers. Bamboo is found in abundance.

There are more than 22 species of mammals and 250 species of birds. Animals found at Bandhavgarh include common langurs, rhesus macaque, Asiatic jackal, Bengal fox, sloth bear, ratel, grey mongoose, striped hyena, jungle cat, leopard, wild pig, spotted deer, sambar, chausingha, nilgai and chinkara. Mammals, such as dhole, the small Indian civet, palm squirrel & lesser bandicoot rat are seen occasionally. Common langurs and the rhesus macaque represent the primate group. Carnivores include the Asiatic jackal, Bengal fox, sloth bear, ratel, grey mongoose, striped hyena, jungle cat, leopard & tiger. The verdant streams and marshes extremely rich in birdlife. The common ones are little grebe, egret, lesser adjutant, sarus crane, black

kite, crested serpent eagle, black vulture, Egyptian vulture, common peafowl, red jungle fowl, dove, parakeet, kingfisher and Indian roller. The reptilian fauna includes cobra, krait, viper, ratsnake, python, turtle, and a number of lizard varieties, including varanus. The park can be scanned either on motor vehicles or elephants. Jeep safaris should be availed from dawn until about 10 am, and then from about 4 pm till dusk. It is advisable to take a guide forest department guide on safaris. The best season to visit Bandhavgarh is from mid-October to June.

## HOW TO REACH

- ➔ **BY AIR:** The nearest airport is at Jabalpur (190 km). From Khajuraho (237 km), Bandhavgarh is a five-hour drive via Panna, Satna and Maihar across stretches of the Vindhyaachal.
- ➔ **BY RAIL:** The nearest railway stations near Bandhavgarh are Jabalpur (190 km), Katni (102km) and Satna (120km) on the Central Railway and Umaria (35km) on the South Eastern Railway.
- ➔ **BY ROAD:** State/Private transport buses ply between Katni and Umaria, and from Satna and Rewa to Tala (Bandhavgarh). Taxis are available at Satna, Jabalpur, Katni, Umaria and Khajuraho.
- ➔ **YOUR HOST:** White Tiger Forest Lodge (MPT),  
Ph: (07627) 265406



## Kanha is perhaps the best bet in Madhya Pradesh for a rendezvous with the big cat and sighting of rare species of other animals and avian life.

**T**iger, tiger burning bright... the Kanha National Park is home to the big cat and a dream destination for wildlife lovers. Considered one of the biggest parks in Madhya Pradesh, the sanctuary is the core of the Kanha Tiger Reserve created in 1974 under the avowed Project Tiger. The mélange of sal and bamboo trees, vast expanse of grasslands, gurgling and snaking streams, make Kanha a paradise for nature lovers. Apart from the tiger, the park is the habitat of the hardground Barasingha a species that has now become a rare in the forests of India.

The national park came into existence in 1955 and painstaking efforts by the conservationists as well as wildlife and forest departments have ensured that Kanha holds its head high as one of the best administered parks in Asia. It is today a haven for a vast array of animals and birds. The clinically delineated circuits of Kanha offers the visitors to have a good look at the cross section of wild species. Those desperate to watch blackbuck, chital and barasingha must park themselves at the meadows.

It is not just a body of wild and the wonderful that make Kanha special, Bamni Dadar offers a lifetime opportunity to watch the sun go down in the horizon. As a result, it is popular as the Sunset Point. And that is not all. The lush greenery and the dense forest come with the package. Species such as Indian hare, dhole or Indian wild dog, barking deer, Indian bison or gaur, palm squirrel, common langur, jackal, wild pig, chital or spotted deer, barasingha or swamp deer and black buck can be seen in Kanha. Those willing to test their patience will be rewarded with the rare sights of the Indian fox, sloth bear, striped hyena, jungle cat, leopard, mouse deer, chausingha or four horned antelope, nilgai, ratel, porcupine, chinkara, Indian pangolin, Indian otter and the Indian civet.

Kanha boasts of a rich bouquet of avian species, such as cattle egret, pond heron, black ibis, common peafowl, crested serpent, racket-tailed drongo, hawk, eagle and redwattled lapwing, various species of fly catcher, woodpecker, pigeon, dove, parakeet, babbler and mynah, Indian roller, white breasted kingfisher and grey hornbill. Those in search of water birds can find a plentiful near the park's many rivulets and at Sarvantal. Early mornings and

late afternoons are the best time to see birds. Safaris are an intrinsic part of jungle and Kanha offers jeep and elephant rides. One can hire MPSTDC jeeps and ride on elephants for tracking the tiger. Visitors can contact the MPSTDC Managers at Baghira Log huts, Kisli and at Kanha Safari Lodge, Mukki.

Bookings for a morning run should be made the previous day. Please bear in mind that jeeps are not always available during peak visiting periods.

The best season to visit Kanha is from mid-October to June. It is preferable to stay put in the jungle at least for three nights. Apart from carrying cottons, visitors should be well equipped with woollens as well. Food is never a problem at Kanha. Kisli has a restaurant and a canteen. The restaurant serves both Indian and Western food. The canteen serves reasonably priced meals and snacks. Mukki also has a multicuisine restaurant.

### HOW TO REACH

Khatia (3km from Kisli) and Mukki are the two main entry points of the Park. From Jabalpur, Kisli is 165km via Chiraidongri and Mukki is 203km via Motinala and Garhi. For travelers from Bilaspur (182km), Raipur (213 km) and Balaghat (83km), Mukki on the state highway No. 26 is more convenient. From Nagpur, Kisli is 259km via Nainpur and Chiraidongri, and Mukki is 289km via Balaghat.

✚ **BY AIR:** Nearest airports are at Jabalpur (160km), Raipur (240km) and Nagpur (335 km).

✚ **BY RAIL:** The convenient railheads are at Jabalpur and Bilaspur.

✚ **BY ROAD:** There is a daily bus service available for Kisli and Mukki from Jabalpur and back. Taxis are available for hire from Jabalpur, Bilaspur and Raipur. It is advisable to reach Kisli before sunset as vehicles are not permitted within the park after dark. For assistance at Jabalpur, contact MPSTDC's Tourist office at the Railway Station or Kalchuri Residency (MPT)

✚ **YOUR HOST:** Baghira Log Huts, Kisli (07649) 277227 (MPT), Tourist Hostel, Kisli (07649) 277310 (MPT), Kanha Safari Lodge, Mukki (07636) 290715(MPT)

CALL OF THE WILD

# KANHA





# PENCH

## LAND OF 'THE JUNGLE BOOK'

Those fascinated by Rudyard Kipling's famous jungle book stories must visit Pench National Park to discover its pristine settings, abundant wildlife and rare flora

One of the most well-sought after wildlife destinations in Madhya Pradesh is the Pench National Park, located in the southern part of the state. The sanctuary was brought under project Tiger in 1992. The name "pench" is derived from the Pench river that splits the park into western and eastern zones. The national park can be further segregated into Indira Priyadarshani Pench National Park and the Mowgli Pench Sanctuary. The legendary setting in Rudyard Kipling's Jungle Book alludes to the park. The fictional character in Kipling's jungle book stories, "Mowgli" is actually a feral child captured in Seoni district, near the village of Sant Baori in 1831. Many of the places described in the Jungle book are actual locations in Seoni district like the Waingunga river with its gorge where Sher Khan was killed, Kanhiwara village and the Seoni hills.

Rich in flora and fauna, the Pench National Park provides a perfect climate for over 1200 species of plants, including some rare ones at that. Mixed forests, shrubs and grasslands also play a vital role in rearing these plants. The same goes for wildlife as well. Apart from the tiger which is obviously the main attraction, the park can boast of a dense population of cheetal and sambhar. In fact, the sanctuary has the highest density of herbivores in India.

Other animals seen here in large numbers include gaur (Indian Bison), neelgai, wild dog and wild pig sloth bear, chousingha, chinkara, barking deer, jackal, fox, palm civet, small Indian civet, jungle cat, hyena, and porcupine. Along with the tiger there are other carnivores like leopard, wild dog and wolf.

Ornithologists will have a field day at Pench. The national park has over 285 species of resident and migratory birds including Malabar Pied Hornbill, Indian Pitta, Osprey, Grey-headed Fishing Eagle, White-eyed Buzzard, to name a few. Birdwatchers will also be treated with four species of the endangered vulture, White-rumped, long-billed, white scavenger and king vulture.

Those want to experience Pench at its best should visit the park during summer months. Jeep Safari and elephant safari enable good sightings of wildlife and birds. It is preferable to opt for a safari at dawn for an unforgettable wildlife experience. Water bodies become preferable places for tigers and leopards in search of water. It is common sight to witness Cheetal, Sambar and Neelgai grazing in the forests and on the banks of the river. Pench National Park can be accessed through two gates. The main gate is from Turia in the east and another entrance is at Karmajhiri in the north.

### HOW TO REACH

- **BY AIR:** The nearest airport is Nagpur, 92km away. The airport in Jabalpur is 200km from Pench.
- **BY RAIL:** Nagpur junction is the nearest railway station from Pench. It is well connected to the rest of India. Jabalpur, which is around 4-5 hours drive is the other major railhead.
- **BY ROAD:** Situated on the Nagpur-Jabalpur highway, Pench is easily accessible by local taxis.
- **YOUR HOST:** Kipling's Court (07695) 232830 (MPT)





# PANNA A TRYST WITH THE NATURE

It is not only the big cat that endears Panna to tourists. The splendour of nature and a vast array of flora and fauna also conspire to make it an evergreen destination in Madhya Pradesh

**A**lthough Panna has earned its spurs on the tourism map of India due to its tiger reserve, it also has other significant offerings like an array of religious monuments that showcase the unique features of both Hindu and Islamic architecture. The city known for its diamond mines is also a nature's paradise, with its vast expanses of green meadows dotted with evergreen trees, rolling forests, and numerous hills and rocks.

The national park in Panna came up in 1981, and it joined the other tiger conservation projects in 1994, when it was declared a tiger reserve. The reserved areas of the park were actually hunting grounds for the rulers of princely states like Panna, Chhatarpur and Bijawar. The Panna National Park has a strategic location—it is here that the forest belt that comes from Cape Comorin ends, and the Gangetic plains starts.

The Ken river, considered one of the major rivers of Budelkhand, flows through the tiger reserve and is home to the Gharial and Mugger. The river makes its way and runs for 55 kilometres through the reserve. Apart from Ken the reserve has vast plateaus, gorges and hills..

The big cat enjoys its fiefdom in the reserve. However, there are others who get their own space like leopard, wild dog, wolf, hyena, caracal and smaller cats, sloth bear, sambar, chital, chowsingha, nilgai, chinkara, and so on. The herbivores can mainly be seen in open areas like grasslands, and on the fringes of the reserve. Reptiles can also be found here in plenty.

The avian population is no less significant. Panna boasts of 200 species of birds and the number includes the migratory birds as well. The avifauna to watch out for includes the White Necked Stork, Bar headed Goose, Honey

Buzzard, King Vulture, Blossom headed Parakeet, Paradise Flycatcher, Slaty headed Scimitar Babbler, to name a few.

The national park is rich in flora as well. The climate is dry and hot. Deciduous forest dominates the landscape of the park. One can easily spot a variety of tree species like Tectona Grandis, Diospyros Melanoxylon, Madhuca Indica, Buchnania Latifolia, Anogeissus Latifolia, Anogeissus Pendula, Lannea Coromandelica, Bosswelia Serrata, etc.

Panna has other attractions like the Fort of Ajaygarh, Mahamati Prannathji Mandir, Pandav Falls, Padmavati Temple, Baldevji Temple, Jugal Kishore Temple, Gatha Falls and Kalinjir Fort, and National Museum.

The Fort of Ajaygarh is located at a height of 800 feet. Mahamati Prannathji Mandir is revered by the Pranami sect followers. Located on Panna road, the Pandav Falls, around 34 kilometres from Khajuraho, make for an excellent picnic spot. The National Museum, established in 1988, showcases an awesome collection of icons and coins.

## HOW TO REACH

➔ **BY AIR:** The nearest airport is Khajuraho.

➔ **BY RAIL:** The nearest railhead is Khajuraho (46km) and Satna (74km).

➔ **BY ROAD:** Panna is well-connected with bus network. Khajuraho to Madla (25km), Satna to Madla (90km), and Panna to Madla (19km)..

➔ **YOUR HOST:** Jungle Camp, Madla (Panna); Ph : (07732) 275275





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